Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. III.—No. 23. NEW YORK, DECEMBER 1, 1860. NEW SERIES.

IMPROVED TOOL FOR ROUNDING FELLOES.

One after another, the several hand processes of working wood are passed over to the operation of machinery. The neat little tool represented in the accompanying engravings is designed for taking off the corners and finishing the inner curve of the felloes of carriage wheels. This operation has been heretofore performed by hand, and it has taken three-quarters of an hour to round the felloes for the four wheels of a carriage; but with the revolving cutters of this machine, running with a velocity of 4,000 revolutions per minute, a set of felloes can be rounded in four minutes.

The felloes are rounded after they are bent and bored for the spokes. There are two sets of cutters, one set for cutting off each of the corners, and each set is secured in a revolving disk, Fig. 2, which disks have their inner edges hollowed, so as to form a semicircular groove in their common periphery when they are placed on their shaft, *a*, Fig. 1. Between the two disks is a thin, stationary plate, operating as a guide or rest for the felloe, to prevent it from being cut away more than is required. Pressing upon the periphery of the rest is a plate, *b*, which has an upright stud or pin, *c*, upon its end, for regulating the distance from the spoke at which the cutting of the corners shall begin, the portion of the felloe about each spoke being left square. The operator lays the felloe with the inner side in the groove formed in the periphery of the two disks which constitute the cutter head, with the pin, *c*, in one of the spoke holes, and then turns it down into the groove till it bears upon the rest. As the cutters take hold, the operator feeds the felloe along, pushing it from him, till it is rounded quite half way to the succeeding spoke hole, when he raises the felloe and catches the next hole upon the pin, *c*, and thus proceeds till the whole of the stick is rounded upon one side of all the spoke holes, full half way to the succeeding holes, when the stick is reversed and the process repeated, completing the operation. The plate, *b*, is made adjustable, to leave a longer or shorter portion of the felloe about the spokes square, as may be desired.

Fig. 1

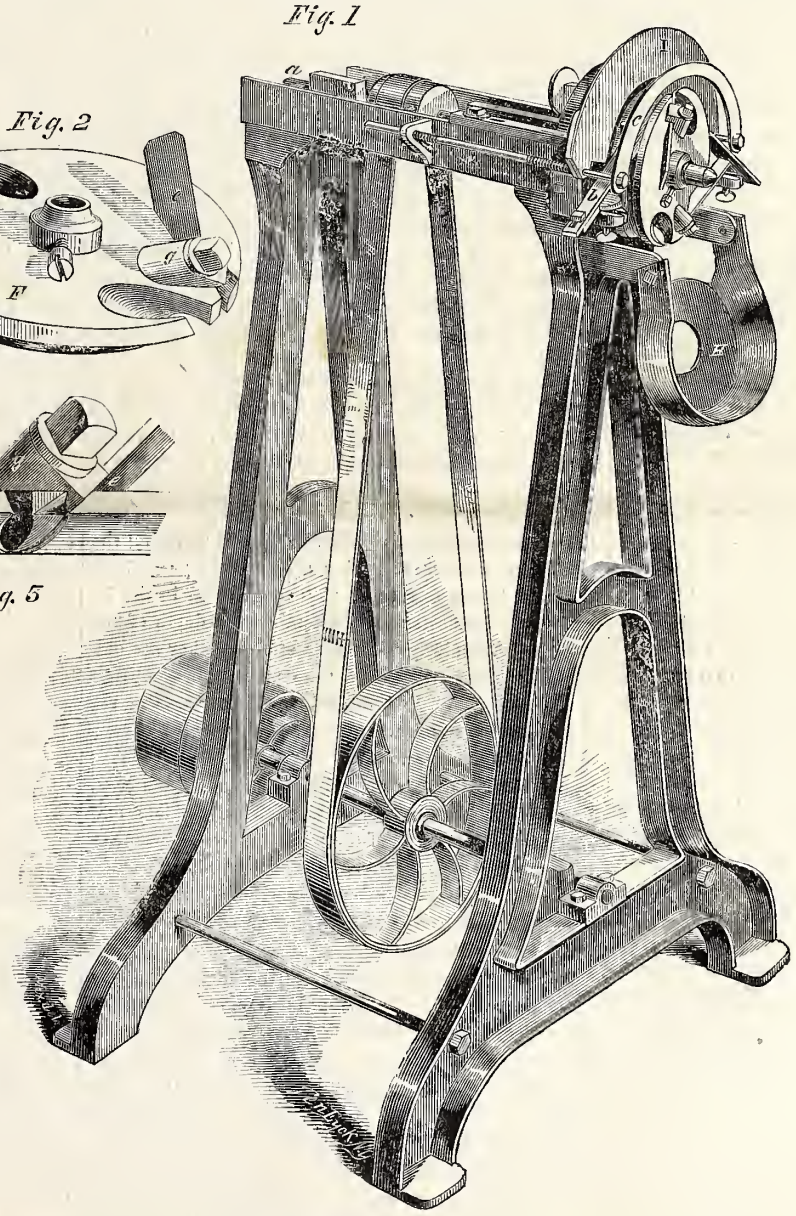


Fig. 2

Fig. 3

DENNISON'S IMPROVED TOOL FOR ROUNDING FELLOES.

The mode of securing the knives to the disks is clearly shown in Figs. 2 and 3. The knives, *e e e*, made of flat pieces of cast steel, are passed through slits in the disk, F, and are held in place by the thick, metal tubes, G G which have notches in their lower sides to catch over the edges of the cutters, and are secured very firm to the disks by screws which pass through them and enter the disks. From the oblique position of the tubes, G G, they cause the cutters to press against both the sides and the edges of the slits in the disks, and thus hold them very securely.

To secure the felloe directly in the middle of the groove in the cutter head, the plate, I, is placed for one side of the felloe to rest against, and the plate, J, is drawn by spiral springs against the opposite side of the felloe. The plate, I, is made adjustable in its position, to adapt it to felloes of different thicknesses. For small variations in the thickness of felloes, the width apart of the disks, F, may be varied, but for any considerable differences, these disks must be replaced by others of different thickness. The cap, H, is made to shield the revolving cutter head from accidental contact with the hand of the workman. Upon the side of the cutter head, opposite to the plate, *b*, is a similar plate, with a pin upon its end, for use in rounding piece felloes.

This machine is suitable for rounding carriage shafts and for a large variety of shopwork, such as rounding stair rails, &c., as well as for the special use for which it was invented—the finishing of felloes of wheels.

This valuable implement was invented by C. H. Dennison, of Brattleboro', Vt., and the first patent was granted, December 6th, 1859, to A. Miller, to whom the invention had been assigned. Application has, however, been made, through the Scientific American Patent Agency, for patents on improvements, all of which are embraced in the above description. Further information in relation to the matter may be obtained by addressing Asa Miller, or C. H. Dennison, at Brattleboro', Vermont.

TOOTHPICKS.—The *American Medical Times* gives the following sketch of the manufacture of, and trade in toothpicks: "Where do the tooth picks come from? It is supposed that the Yankee, when he first felt the necessity of cutting a stick of timber in order to provide himself with a toothpick, gained the knowledge of whittling, and has since kept and improved upon the lesson. A New Englander will produce a toothpick with his knife from almost everything except a bar of iron; but with all his inventive genius, it has remained for the natives of Chili, to supply this toothpicking nation with a large proportion of the instruments for gratifying their habit or necessity. The aged and decrepid, and the young of both sexes of Chili, are engaged in preparing those little orange sticks that one finds at every restaurant and hotel in the city and country. These they whittle out with astonishing rapidity, at the rate of five and six hundred an hour. The sticks are then packed in bundles of a thousand each, and sent to this city; being imported expressly by a lady in Division-street, whose son superintends their manufacture in Chili. Here the toothpicks are sold for twenty cents a thousand, and scattered all over the country—placed in the restaurants and hotels, and in the hands of every toothpicking Yankee in the republic. To such an extent is this traffic carried, that the proprietors of the Astor House alone purchase eight or ten barrels of each importation, and retail them among the country hotels. A restaurant with a good run of custom will consume about twenty thousand toothpicks in three weeks."

CAREFULLY corrected statistics show that out of a population of 843,741 contained in this city—exclusive of the suburbs—638,000 are unprovided with any place of public worship. Hence only one person in four could go to church if he desired.

SKETCH OF PROFESSOR FARADAY.

In connection with Faraday's admirable and invaluable lectures, the publication of which we concluded in our last number, our readers will doubtless be interested in the following sketch of the author, which we take from Appleton's American Cyclopædia:—

Michael Faraday, an English chemist and natural philosopher, was born in London in 1794. The son of a smith, he received but little instruction in his youth, and was apprenticed to a bookbinder. His tastes were averse to the trade, but led him to the study of books, the construction of machines, and the performance of chemical experiments. Hearing a course of lectures by Sir Humphry Davy, in 1812, he sent him a copy of the notes he had taken, and requested his assistance to enable him "to escape from trade and to enter into the service of science." Davy received the application favorably, and in March, 1813, appointed Faraday chemical assistant in the laboratory of the royal institution. In the autumn of the same year, Faraday, as secretary and scientific assistant, accompanied Davy in traveling, which was continued till April, 1815, when he returned to the royal institution, with which he has ever since been connected, becoming professor of chemistry in 1833. His earlier researches were eminently of a practical character. He investigated the manufacture of steel, and the character of its alloys with silver and platinum. In 1827 he published the first edition of the work on "Chemical Manipulation," of which a second edition appeared in 1836. It contained full descriptions of the apparatus, and was the only practical guide for the various operations of the laboratory. Experimenting upon gases, as carbonic acid and others, which were regarded as permanent in form, he succeeded, by employing intense cold and pressure, in liquefying and even solidifying them. In 1830 he published a valuable paper on the "Manufacture of Glass for Optical Purposes," and introduced a new variety, which he formed of silica, boracic acid, and oxyd of lead. He was early interested in electrical researches, assisting Davy in 1820, in prosecuting those first entered upon by Oersted, on the relations of electricity and magnetism; and in 1824 he performed for the first time the remarkable experiment, developing the close connection of those two forces, of causing a magnet floating on mercury to revolve continuously round a conducting wire, and again a conductor to rotate round a fixed magnet. The magnet, still more wonderful, was made to revolve with great rapidity when an electrical current was passed over half its length. In 1831 the first of the series of papers, afterwards collected and published in a separate form under the title "Experimental Researches in Electricity," appeared in the "Philosophical Transactions." They were continued in this and in other scientific journals, and were finally collected in 3 vols. 8vo. (London, 1839, 1844 and 1855.) They contain the results of a series of original and systematically conducted investigations, extended through many years, in one of the most obscure fields of physical research; and they abound in brilliant discoveries, the credit of which no one contests with Faraday. The most important of these researches relate to electro-chemical decomposition; the induction of electric currents from other currents and from magnets leading him to the discovery of magneto-electricity; the influence of the magnet on all bodies leading to the division of magnetics and diamagnetics, and the optical changes induced by magnetism.

His experiments showing that the amount of any compound substance decomposed by an electrical current is proportioned to the quantity of electricity employed, and that the elements separated in the same time are in the proportion of their atomic weights, make it highly probable that electricity is the same force as chemical affinity, and that it is generated by chemical action only. The fact which he discovered, that just enough electricity generated by the oxydation in the battery of one atom of zinc to decompose one atom of water, is additional proof of the same conclusion. He proved, moreover, the identity in the nature of electricity, whether derived from the battery, the frictional machine, thermal or magnetic action, or animal bodies, and explained the wonderful differences in its manifestations resulting from its development in intensity or in quantity.

Professor Faraday holds the highest rank among popular lecturers, as well as among original experimenters. He has made it a practice to give lectures one evening in the week, not exclusively for the benefit of the classes of the institution; and the interest he has excited in these causes them to be regarded among the attractions of London in the winter season. He makes them interesting by perfect ease and simplicity of manner, while wholly absorbed in his subject, and by his talent of clearly explaining its principles, at the same time that he is skillfully conducting the experiments that illustrate it. Few scientific men have received so many distinctions from learned societies and institutions. They have, however, failed to tempt him from the post into which he was installed by his early patron, or to deprive him of the natural modesty and artlessness of character that secure to him an esteem more desirable than that called forth by the highest talents. The Queen of England allotted to him, in 1858, a residence at Hampton Court, and since 1835 he has received a pension of £300 a year.

QUEER PREMIUM FOR MECHANICS.—We copy the following sensible remarks from the San Francisco *Pacific*:—"The managers of the Mechanics' Institute Fair have, in their wisdom, concluded to pay a bonus of $250 for the best billiard playing. We look upon it as $250 paid for the elegant art of living, called 'bumming.' Our best billiard players—those who pursue it as a science and glory in it as a rare accomplishment—are not found in places where Donahue's marine engines are made; where quartz mills are manufactured; where hard work, busy toil, untiring industry invent, construct, and give to the world the ten thousand useful materials and implements that mark the civilization of the times. If anywhere, the 'corners,' the 'saloons,' are the schools that furnish men handy with the cue. If money is to be given away, how much better to reward useful industry than a mere elegant pastime, which, too often, is a mere vicious dissipation."

THE FINE ARTS.—The New Institute of Fine Arts was opened in this city on the evening of the 19th inst. It has been established by Mr. Derby, the proprietor of the well-known Dusseldorf collection. Special interest was imparted to the occasion by the display of a collection of Italian pictures by Mr. Jarves, illustrating the growth and progress of Italian art from the years 1000 to 1600. There are three picture galleries in the Institute, all connected and extending to a depth of 200 feet, from Broadway to Mercer street. They are certainly the most beautiful for the purpose ever opened in New York. The principal apartment contains the Dusseldorf collection with some additions. The decorations are elegant, and the collections will be enriched from time to time with valuable modern paintings. New York is the center of attraction for the fine arts in America, and some of the most highly gifted native and foreign artists now reside within its precincts.

LEATHER FROM SNAKE SKINS.—At a recent meeting of the French Academy of Sciences, Dr. Jules Cloquet produced a pair of boots made of the tanned skins of the boa constrictor. This material is remarkably strong and supple; the scales have preserved their natural imbrication and color after the process of tanning, and the inside of the skin displays the marks of the scales in alternate layers and depressions. Dr. Cloquet observed that it would be desirable to make further attempts to introduce the skins of the inferior vertebrata into use, seeing that, in thickness and durability, they offer greater advantages than those of the superior classes.

SWAN STERN SHIPS.—A new system of shipbuilding has lately been introduced in England by M. Tovell. The bow is copied from the head of a salmon, the stern from the after body of a swan. Several vessels have been built upon this principle, and they have all proved to be fast sailers, with great stowage capacity. The keelson in these vessels is curved, not straight as in many other ships.

DR. LANKESTER, of England, thinks it probable that the cessation of the plague in Europe may be owing to the introduction of the potato as an article of food.

AMERICAN NAVAL ARCHITECTURE.

[Reported expressly for the Scientific American.]

THE STEAM FERRY BOAT "PRIMEIRA."

English houses have successfully monopolized the steamship business of Brazil ever since the introduction of steam as a motive power until the present period. Last year, Dr. Thomas Ranney, an American citizen, after many months of incessant labor, established a company in Rio Janeiro, for the purpose of running steamers on the American plan in that country, and he succeeded, in spite of the combined opposition of the old Thames Boat Ferry Company and the whole English influence, in obtaining a charter from the imperial government of Brazil, conferring the right of navigating the bay of Rio Janeiro for thirty years. The new company at once resolved to erect suitable vessels, and for this purpose came to the United States, where they immediately contracted with the well known shipbuilders, Messrs. Webb & Bell, Greenpoint, L. I., to construct three steam ferry boats for them. The name of the steamer that heads these particulars will at once indicate that this is the first of them. As no other vessel has ever been built for that country by our shipbuilders, it is reasonable to hope that the *Primeira* will give such an excellent account of herself as to secure still more business of the same sort for our ship yards.

We annex full and correct particulars of this vessel:—Length of keel, 118 feet; length at load line, 128 feet; length on deck, 130 feet; breadth of beam, 28 feet; depth of hold, 10 feet; depth of hold at ends, 9 feet 6 inches; draft of water at load line, 6 feet; area of immersed section at this draft, 140 square feet; tunnage, 320 tuns.

Her hull is of white oak, chestnut and hacmetac, and very securely fastened with copper, &c. The floors are molded 13 inches and sided 9 inches. The frames are 24 inches apart from centers.

The *Primeira* is fitted with one vertical beam condensing engine: diameter of cylinder, 32 inches; length of stroke of piston, 8 feet; diameter of water wheels over boards, 16 feet; length of wheel blades, 6 feet 7 inches; depth of same, 2 feet, and their number is 14, which are of wood.

She is also supplied with one drop flue boiler, whose length is 21 feet; hight of boiler, exclusive of steam chimney, 8 feet 4 inches; breadth of same, 8 feet 4 inches; location in hold; number of furnaces, 1; length of grate bars, 5 feet 4 inches; number of flues above, 5; number in center, 5; number below, 4; internal diameter of flues above, 1 foot 3½ inches; internal diameter of those in center, 1 foot 3 inches; internal diameter of those below, two of 1 foot 9 inches and two of 11½ inches; length of flues above, 11 feet 4 inches; length of those in center, 8 feet 9 inches; and those below are 10 feet 10 inches. The diameter of smoke pipe is 3 feet 4 inches; hight above grate surface, 38 feet. The boiler possesses a grate surface of 39.34 square feet, and a heating surface of 900 square feet. The engine is fitted with expansion gear, and a variable cut-off. The depth of her keel is 6 inches.

Her rig is that of a schooner. She has one independent steam, fire and bilge pump, bilge injections, and all ordinary valves to bottom. The machinery of this vessel was constructed by the Novelty Iron Works, foot of Twelfth-street, East river, this city.

This steamer, as we remarked above, is intended for service on the beautiful bay of Rio Janeiro; the particular points between which she is to run are the city and Praia Grande and San Domingos. The others in process of construction are to be of different dimensions, and when completed will ply between Rio and Botafogo and the Cattete.

THE PROPELLER "PEMBROKE."

The hull and machinery of this steamer were constructed by the Atlantic Works, East Boston, Mass. Her owners are Messrs. W. E. Coffin & Co., and the route of her intended service is from Boston to Pembroke. She is claimed to be an excellent vessel of her class, and so we proceed to give the essential elements of her construction:—Length at load line, 107 feet; length on deck, 110 feet; length for tunnage, 114 feet; breadth of beam (molded), 24 feet 6 inches; depth of hold, 9 feet; depth of hold to spar deck, 9 feet; draft

of water at load line, 9 feet 3 inches; tunnage, 215 tuns.

Her hull is of wrought iron plates, ¼ and ⅜ of an inch in thickness, and securely fastened with rivets ⅝ of an inch diameter every 2⅜ inches. Depth of frame 3.5 inches; width of web, ⅜ of an inch; width of flanges, 2.5 inches; number of strakes of plates in hull from keel to gunwale, 10. Description of cross floors, I, ¼ of an inch in thickness and 12 inches deep; distance of frames apart from centers, 24 and 30 inches; depth of keel, 9 feet 3 inches.

The *Pembroke* is fitted with one vertical direct engine: diameter of cylinder, 26 inches; length of stroke of piston, 3 feet; diameter of propeller, 8 feet; length of blades of screw, 2 feet 6 inches; pitch of same, 17 to 20 feet; number of blades, 3; material, cast iron.

She is also supplied with one tubular boiler, carried on deck: length of boiler, 14 feet; breadth of same, 6 feet 6 inches; length of grate bars, 5 feet 6 inches; number of tubes above, 72; number of flues below, 2; external diameter of tubes above, 4 inches; external diameter of flues below, 20 inches; length of tubes above, 9 feet 2 inches; length of flues below, 5 feet 8 inches; diameter of smoke pipe, 32 inches; hight of same above grate surface, 32 feet. The boiler possesses a heating surface equal to 1329.2 square feet. The engine is fitted with expansion gear, cut-off variable, usually ¼ stroke.

The engine will weigh 31,078 pounds; the boiler without water, 19,593 pounds; pressure of steam, 30 pounds above the atmosphere; revolutions at this pressure—ordinarily. 50, maximum, 60; easy speed attained, 9 knots; maximum, with 55 revolutions, 10 knots. Length of boiler room, 21 feet 9 inches by 14 feet 4 inches; length of engine room, 8 feet 6 inches by 8 feet. The boiler room is on deck.

In addition to these features she is schooner rigged; has independent steam, fire and bilge pump, bilge injections, and bottom valves to all openings in her bottom; has also two watertight athwartship bulkheads and independent rudder post.

EMPLOYMENT OF ELECTRICITY IN THE EDUCATION OF SILK WORMS.

Such is the heading of an article which we find in *Le Genie Industriel*, and of which the following is the substance:—

Mr. Sauvageon addressed to the Academy of Sciences, at its session of the 18th of June last, an interesting note on a new application of electricity. He states that he took 53 silk worms at hazard from a large number, and subjected them daily for a few minutes to the action of electricity, while they were passing from the third to the fourth slough. He placed them on some mulberry leaves, spread on a piece of sheet iron which was insulated by resting on glass tumblers, and then connected the iron with the two poles of a small Bunsen galvanic battery. The worms immediately showed uneasiness, those that were on the iron standing up on two of their eight feet, and all appearing to be uncomfortable. After continuing the current for about two minutes, the worms were removed to their ordinary table when they resumed their feeding with activity.

By this treatment, Mr. Sauvageon obtained 53 beautiful cocoons, while the worms from which his were selected had none of them begun to spin, and it was feared, from their appearance, that several thousand of them would be required to produce as many cocoons as he had got from his 53.

A Canine City.—On the southern arm of the Red river there is a village of prairie dogs, which is no less than 25 miles in length by as many in breadth. It consists of subterranean galleries, sometimes nine feet deep and about five inches wide, and the superstructure is formed of earth thrown up by these curious little animals. Towards the end of October, when these little dogs feel the approach of cold winter, they fasten up all the passages leading to their burrows with straw, then they fall asleep until the return of spring. They are happy little fellows, and if they could speak, they might boast of a city spreading over a greater space than London, and containing a greater number of special inhabitants.

LORD PALMERSTON'S ADVICE TO MECHANICS.

At a recent meeting of the Leeds Mechanics' Institute and Literary Society, Lord Palmerston delivered an address, in the course of which he said:—

"If I were permitted to give to the working and industrial classes a single word of advice, I should say this: Whatever your calling in life may be, learn fully, deeply and completely everything that bears directly on that calling. Make yourselves masters of everything that will tend to help you in that particular sphere of industry. But don't confine yourselves to that. Cultivate your minds by acquiring as much knowledge as you can on as many subjects as you can. You will learn but little of each, but that little of each will make an important aggregate in the main; and every new branch of knowledge which you enter into, every addition made to your general stock of information, will improve the faculties of your minds, just as various exercises improve the powers of the body, and will make you more skillful, more able, more clever in the performance of your particular duties than if you were skilled only in that particular and simple branch."

The speaker thought mechanics should understand chemistry and learn the laws of motion, the nature of gravitation, of the progressive velocity of falling bodies—all matters elementary in their nature, but applicable to the daily pursuits of life. They should be taught the theory of the mechanical applications of the wedge, the inclined plane, the lever, and matters of that sort.

After alluding to the importance of natural history, Lord Palmerston thought there was no reason why the working classes should not learn the general outlines of a still further science, and be taught the main principles of the organization of the universe. There was no reason why they should not be taught that those innumerable bright spots which bespangle the sky on a clear night are not simply ornaments in the heavens, but that they consist of millions of suns, larger, many of them, far than our own earth, surrounded by a planetary system like ours, and extending to such an infinity of space that, whereas the light which comes from our sun, which is 95,000,000 miles from the earth, reaches us in eight minutes, the light from some of these distant suns is calculated to have been hundreds (and, in some cases, thousands) of years in reaching the earth. These contemplations are useful and healthy to the human mind. They inspire us with an awful respect and sentiment of the vast powers, of the vast wisdom, and of the benificence of that Almighty Being by whom the great and wonderful expanse of creation has been formed. And while, on the one hand, these contemplations, enlarging the human mind, must tend to abate the pride and vanity of prosperity, so, on the other hand, they must tend to calm and console those who may be laboring under adversity, by letting them see that the affairs of this world form but a small and minute part of the general dispensation of the Almighty, and that all these great arrangements, whatever their partial and temporary effect, are destined, in the main, for ultimate and permanent good.

Of lecturers, the speaker remarked:—

"The lecturer is to the student what a good guide is to the man who, for the first time, enters a city or a country, the geography of which he is unacquainted with, but who knows that there are certain points which he wishes to arrive at, and who, if left to his own unaided wanderings, might spend much time and much labor in arriving at the object of his pursuit. But the guide and the lecturer take the traveler and the student by the hand, lead them by easy and pleasant ways to the ultimate object of their search, and place them in possession of the end and of that instruction which they are endeavoring to attain. There is one defect in lectures. The knowledge which a man acquires by his own unaided exertions, working it out by books, by experiment and by reflection, remains fixed in his mind, because the trouble that he has taken to acquire it implies deep attention to every stage of the process. We all know that the memory is retentive in proportion to the degree of attention which has been paid to the object stored in the memory, and, therefore, although lecturers do lead men easily and usefully to useful results which were acquired by deep and intense study, and by long continued study on the part of those who gave the instructive lectures, sometimes what goes in at one ear comes out at the other, and the student, at the end of a course of lectures, if he has not been interested in the subject by knowing that it bears upon his active pursuits, may carry away permanently but little of what he has heard."

A romantic French chemist burned the body of his friend, extracted from it the iron that was contained in the blood, and had it made into a finger ring, which he wore in memory of his friend.

Minerals in North Carolina.—The Assistant State Geologist of North Carolina—Mr. C. D. Smith—has recently put forth a very interesting letter on the mineral wealth of western North Carolina. A copper-bearing belt runs through Macon, Jackson and Haywood counties. The veins descend 20 feet in depth in some of the leads, and the ore is rich. Most of the ore is yellow copper pyrites, though occasionally some green carbonate and red oxyd are found. They yield from 20 to 30 per cent of metallic copper. The mining is quite extensive near Franklin. Magnetic iron ore is found in great abundance near Franklin—the same kind of ore that the celebrated Swedes iron is made from. Manganese is also found in great quantities. In Cherokee county, the supply of hematite iron ore is immense. It extends down Valley river to the Georgia line. The marble of Cherokee county is snow-white, variegated, and blue and banded. On the Natibala river, there occurs a fine flesh colored marble. Thick beds, also, of agalmatolite, or figure stone, suitable for furnaces and fine porcelain ware, arrest the attention. There is also plenty of coal, which is the main element of power in modern engineering and mining. North Carolina is rich in minerals, but capital, labor and railroads are wanted to develop these natural resources.

Cambridge Museum of Natural Science.—The new museum (partly built) of comparative zoology at Cambridge, Mass., is to be 360 feet long, with wings each 200 feet long, making the whole 760 feet in length, with a uniform width of 60 feet. The hight of that part of the museum already opened is four stories, and is fireproof, with arched ceilings and massive iron supports. This museum was projected by the learned and indefatigable Agassiz. Twice a week it is open to all teachers in the State of Massachusetts who may seek to gratify their curiosity or improve their minds. This museum already contains almost splendid collection of specimens, there being no less than 3,500 species of fishes, which makes it take the third in rank in this department with the museums of Europe. As our country is so extensive, and the sources so numerous and varied for securing specimens of natural history, we have no doubt but the Cambridge Museum, if it had the funds to purchase and transport specimens, would soon be the very first in the world.

New York Population.—The census of New York city, recently taken, makes the population 821,113. It is calculated that during the month it was taken there were as many as 30,000 citizens absent in the country, which would thus give a population of 850,000, at least. This we think is about the truth of the matter. In 1855, the population was 629,810, which gives an increase of 221,000 in five years. The expansion of New York is tremendous; if it progresses at the same rate that it has done during the past five years, it will contain a a population of 1,143.333 in 1865; 1,534,444 in 1870; and in twenty years hence, a population of 2,727,900—exceeding that of London at present. In the course of thirty years from the present date, San Francisco and New York will be the largest cities in the world—the one mistress of the Atlantic, the other queen of the Pacific.

Gas Meters.—The time has arrived when a little attention paid to gas meters will save a world of trouble when cold weather attacks them. If people would pay as much attention to these indispensable articles as they ordinarily do to a bushel of potatoes, no trouble would be experienced. A box to inclose the meter, with a lining of straw or rags, or sawdust, or even an old bed-quilt wrapped and tied around it, will keep the frost away, and save the temper of the household on many otherwise trying occasions.

Giffard's Injector, &c.—Some of our readers may have seen the correctness of our explanations of Giffard's injector, the gyrascope, and the power expended in working a feed pump, called in question. As these explanations were given in the plainest language that we could command, we know of no means of further elucidating them by discussion; but we wish just to say that we have no doubt that our positions on all these matters are perfectly sound, and that they will finally be so regarded by all minds capable of understanding them.

HANGING AND DRESSING MILL SAWS.

MESSRS. EDITORS:—There are some ideas on this subject put forth in the communication of Mr. W. Miller, on page 148 of the present volume of your journal, which are very different from those which I entertain, and for the benefit of young sawyers I will give some of my experience and opinions respecting the hanging, setting and filing of saws—the result of twenty years' experience in building and rigging sawmills, with a keen *lookout* for the best methods.

In rigging a sawmill, I first see to it that the sliders are plumb in the line; then I place the saw in the *clips* and strain it a very little. I now give it from three-fourths to an inch rake, according to the kind of timber to be sawed. About four feet of cutting edge, lightly divided, is sufficient for a seven-foot saw. I give the rake to the saw by *sighting* the stile of the sash. This is a convenient method. Keep the lower tooth so that it can just be seen by the stile, and then let the upper tooth project the required rake. A saw should never rub the solid wood in going up; it should be perfectly parallel with the face of the slides, and strained moderately. Hard straining of saws is quite common, but this does not always make them run straight, while the proper dress upon the edge generally does. I keep the teeth two inches in length for soft timber; the under part of each tooth is inclined downward one-fourth of an inch at the point. I commence to set the saw by leaving the lower tooth without any set; I then set the four next teeth right and left in the common way; then I leave another straight tooth; and so on to the top, leaving every fifth tooth straight, and about one-sixteenth of an inch longer than the set teeth. I file them level underneath, and turn the points down a little with a hammer. The set should be a little wider at the top than at the bottom, and the outer corner of the set teeth in a straight line. The set teeth are filed a little more inside underneath than on the outside, to draw the sawdust to the middle, in order that the middle straight tooth may carry it down instead of working it back by the side of the blade. In filing the top of the teeth, I leave them perfectly square to the timber at the points, and give a short chisel bevel to each at the point, so as to impart strength to the edge. The set should be effected at the butt of the teeth, as this tends to make smooth lumber. The method of setting described requires less breadth of set, thereby effecting a saving of power and an economy in the timber. I cut out all the *gum* possible in the saw, so as to have each tooth of sufficient strength. Saws set in this manner do not heat, and the teeth always keep square at the points.

I do not approve of setting teeth at the points only, because, when so set, they are liable to corrugate the lumber. It is not advisable to hammer the teeth more than merely to turn the edges down a little, as a hard saw is liable to be injured by too much use of the hammer. My method of rigging saws prevents the sawdust from working back by the side of the blade; the saw runs clear, and permits of as "heavy feed" as any other plan. J. P.

Bainbridge, Ind., Nov. 17, 1860.

THE ETHER DISCOVERY.—The Commissioner of Patents has refused the application of Dr. Morton, of Boston, for a renewal of the patent granted to him and to Dr. Jackson, in 1846, for the use of sulphuric ether to promote anesthæsia. Dr. Jackson at that time assigned his share of the patent to Dr. Morton, but he has now protested against its renewal, and the Commissioner decided that where a patent has been originally granted to two joint discoverers, they must unite in an application for a renewal. Certainly, the Commissioner is right. He could not legally extend a patent granted to joint discoverers on the application of only one of the patentees

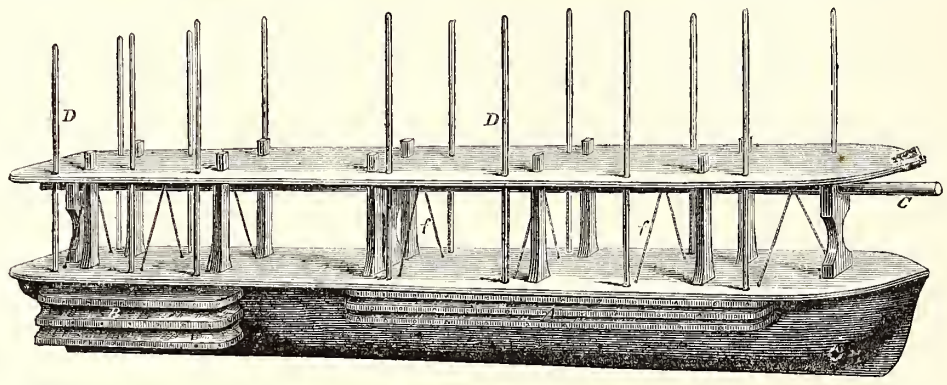
THE PRESIDENT ELECT'S MODE OF BUOYING VESSELS.

PATENTED MAY 22, 1849.

In discharging our accustomed round of duties at the Patent Office recently, our attention was called to a model of a patented mode of buoying vessels, the invention of no less a personage than the President elect of the United States.

Thinking it would interest a vast number of our readers to see what sort of an invention emanated from the brain of so distinguished an official, we had an ambrotype taken from the model, and a copy of the patent transcribed from the records of the Office for publication, extracts from which we give below. The merits of this invention we are not disposed to discuss; but we hope the author of it will have better success in presiding as Chief Magistrate over the people of the entire Union than he has had as an inventor in introducing his invention upon the western waters, for which it was specially designed.

The invention illustrated in the annexed cut relates to an entirely novel mode of buoying steamboats over bars and shoal places in rivers. Buoyant chambers, A and B, constructed in the same manner as bellows, with the tops and bottoms of boards or metal plates, and the sides of india-rubber cloth or other flexible material, are secured at the sides of the vessel under the guards. Stiff rods, D D, pass through the tops of the chambers, A A, and are secured rigidly to their bottom boards, so that, by pushing down these rods, the chambers are expanded, as shown at B, and by drawing the rods up, the chambers are folded snugly under the guards, as shown at A. For working the rods up and down, endless ropes, *f f*, are secured to them and passed several times around a central shaft, C, which extends through the middle of the boat just below the upper deck, the ropes passing over rollers or sheaves secured to the lower side of the upper deck, and thence down by the sides of the rods, D D, under sheaves secured to the lower deck, so that, by turning the shaft, C, in one direction, the rods are forced down and the chambers expanded; while, by turning it in the other direction, the rods are drawn up and the chambers are folded, as shown at A. The shaft, C, is worked by the engine or by hand power, whichever may be most convenient.



ABRAHAM LINCOLN'S APPARATUS FOR BUOYING VESSELS.

This invention illustrates forcibly the variety of talents possessed by men; it is probable that among our readers there are thousands of mechanics who would devise a better apparatus for buoying steamboats over bars, but how many of them would be able to compete successfully in the race for the Presidency?

STEAM EXPERIMENTS—LETTER FROM THE SECRETARY OF THE NAVY.

NAVY DEPARTMENT,
Nov. 15, 1860.

GENTLEMEN:—I have received your letter of the 14th inst.

The Department cannot change its order, or postpone the day for the meeting of the Board at Erie, Pa. The Board will be occupied a month or more in making the experiments, and it will be a week or more before arrangements can be completed for commencing them, which will afford ample time for all to be present who take an interest in the matter.

I am, respectfully, &c., I. TOUCEY.

MESSRS. MUNN & Co.,
New York.

WHIPPLE'S AIR ENGINE.

MESSRS. EDITORS:—In your issue of the 10th inst., I find a report of a discussion before the Polytechnic Asssciation of your city, in which mention is made of a caloric engine invented by Mr. Whipple, of Boston. Mr. Seely states that Mr. Whipple has succeeded in operating his engine finely for a few moments, but so far the inventor is unable to run it for any length of time, owing to the excessive heat developed.

Knowing something of Mr. Whipple's engine and your willingness to correct errors, I am happy to inform you that I have seen the above engine running from six to eight hours per day for some time, and that Mr. Whipple has found no difficulty from excessive heat since he made his last improvement; furthermore, by the peculiar arrangement of the fire chamber, in which he uses coal (hard or soft), the whole product of combustion acts directly on the piston, which, being elongated from the packing down, nearly reaching the coal, whereby he uses the heated air immediately, and, by a curious and original device, Mr. Whipple has attached an automatic feeder; and the only difficulty that arises is in regard to finding its own fuel, which may in time be overcome. His engine makes from 100 to 150 revolutions per minute, and runs very even at that; and he would be pleased to show and explain it to any one who desires to see it.

Mr. Whipple is now building one of larger dimensions than the one above alluded to, with still further improvements, which he is confident will show its entire practicability, and will prove to be the strongest and most economical motor in use. Should you wish to learn more particulars in regard to the above engine, I have no doubt but that Mr. Whipple would be most happy to give them. H. T.

Boston, Mass., Nov. 17, 1860.

THE GYRASCOPE GOVERNOR.—A correspondent of the London *Engineer*—for whose opinions, however, the editor expressly disclaims all responsibility—cavils at our explanation of the principle of the gyrascope, calling it meager. We are informed by another paper that this correspondent has written a voluminous treatise on the gyrascope, and he is evidently annoyed at our turning it off in twenty lines, as a very simple matter. It is true that a great many more things might be written in relation to the gyrascope than were contained in our article; but that our explanation of the *principle* is the correct one, will certainly not be disputed by any one who has mastered the subject. Like all ponderous bodies, the revolving disk of the gyrascope is subject to gravitation, but all that is *peculiar* to it results from inertia, tending to retain a rotating disk constantly in the same plane of rotation. It is also the same power which is brought into play in the governor which we described.

THE GREAT WESTERN PLAINS OF AMERICA.—These occupy a longitudinal parallelogram, nearly one thousand miles wide, extending from the Texan to the Arctic coast, and from the Rocky Mountains to the western border of Louisiana, Arkansas, Missouri and Iowa, an area equal to the surface of twenty-four States between the Mississippi and the Atlantic, without a single abrupt mountain, timbered space, desert or lake. There is no timber on this area, and single trees are scarce. The soil is not silicious or sandy, but a fine calcareous mold. The country is thickly clad with grasses, edible and nutritious, through the year, and swarms with animal life. The climate is comparatively rainless; the rivers which abound, and which all run from west to east, serve, like the Nile, to irrigate rather than drain the neighboring surface. From their dimensions and position they may yet be the pasture fields of the world, and upon them pastoral agriculture may yet become a separate department of national industry.

HOW GOLD AND SILVER THIMBLES ARE MADE.

The father of the human family was unquestionably the father of tailors, but we are inclined to *guess* that he had to call in the aid of his ingenious descendent—Tubal Cain—to fabricate the first thimble. On this subject, however, we are not dogmatic in opinion, as our memory runneth not back to such distant dates and transactions; and as old history is rather dumb on the subject, and modern chroniclers too prodigiously prosy and postulatory, we will, Yankee-like, bring the historic part of the business to a focus by guessing at probabilities. Probably, then, the first thimble was a small disk of hard bone secured to the finger with a thong of animal skin; but, be that as it may, the thimble as it now is in its most highly developed condition, is a positive American triumph—*nothing shorter*. The best styles of gold and silver thimbles are really beautiful articles, classed as jewelry, requiring much mechanical skill to fabricate and artistic proficiency to ornament. There are few persons, however, who are really acquainted with the mode of their manufacture, as we have learned by conversing upon the subject; the idea being quite prevalent that they are formed by casting the metal in molds. We will therefore describe how they are made, as we witnessed the operations a few days since in the manufactory of Ketcham Brothers & Co., Nos. 4 and 6 Liberty place, this city.

The first operation in silver thimble making is alloying the metal, melting and running it into bars of a determined quality, according to the character and price of the articles to be made. The bars are next drawn out into thin ribands by passing between pressure rollers; after this they are cut in a machine according to a specific pattern for the size of the thimble wanted, into little flat pieces, tapered at the sides and curved at the top and bottom—each the progenitor of a thimble. The lower curved edge of each is now *upset* and slightly lapped over with a small rimming machine, so as to form a neat rim on the lower edge. All the little flat pieces of silver having rims on their lower edges are now taken to the swedging table, where each is bent round on a tapering spindle or *beak iron*, so as to bring the two edges close together. This operation forms them into short conical tubes, with a seam on one side. They are now taken to the soldering furnace, where a small clear fire is maintained in a shallow tray provided with ledges for the reception of the articles. A little strip of silver solder is now laid in the inside of each, upon the seam, and several, one after another, are placed in the fire with a small wire poker. The solder soon melts with the heat, and fills up the entire seam of the first thimble that is put in; then it is lifted out with the wire poker, and laid down to cool. In this manner the operation is conducted until a respectable pile of thimbles are thus soldered and laid down in rows on the jam of the furnace. At this stage, a crude thimble resembles a little conical ferrule, open at both ends; and it is next placed upon a steel punch and its lower end inserted in the recess of a steel die, where it is swedged so as to turn over the upper edges to round its top, and leave only a very small hole on the tip. A little plug of silver is next soldered in the hole on the top, as follows: a small brass box, covered with wire gauze, is fitted upon a gas pipe in place of the common burner, and the flame which is obtained at the surface of the gauze gives out an intense heat. The thimble is then placed upon a piece of charcoal, or any good non-conductor, which is held in the left hand of the operative, who now places a strip of solder on the tip and then projects the flame with a blowpipe directly upon the solder, which melts rapidly and fills up the entire space around the plug; and thus the top is formed solid on the thimble. In order to make the top more hard, strong and durable, another disk of steel is often soldered on the top of the one made as above described.

If the thimbles are to be chased, this is now executed by hand engraving, after which they are transferred to the lathe to he turned, burnished and milled. For these operations, a thimble is placed on the steel spindle of a hand lathe, and as it revolves, the skillful operative lays his tool on the lathe rest and brings it up against the thimble so as to turn off the surplus metal on the top and side, making an even surface. The next oparation is that of milling, which consists in producing the small indentations on the bottom and a portion of the sides. The indents on the bottom are made with a small steel roller having a serrated edge, and which greatly resembles a lilliputian spur. This is held over the rest of the lathe against the tip until the whole top surface of the thimble is indented. The milling on the portion of the side is executed in the same manner with a broader roller, made slightly conical, so as to coincide in form with the taper of the thimble. Those parts of the side which require burnishing are now operated with a proper tool, and the thimble is then taken off the spindle and placed in a small wooden chuck which is secured on the lathe and made to revolve with the spindle. The interior of the thimble is now brought before the operative, and, as it revolves, he thrusts his tool into it as scientifically as a bee projects her trunk into the cup of a flower. Very soon argentine chips are seen to flow out into a leather apron tacked to the lathe for the purpose of catching the precious crumbs, and in a twinkling the inside surface, which had been dim and dull, becomes bright as glass, and both inside and outside are finished. The thimble, it may be said, is now completed; but we must not omit to mention that, during the several manipulations, it is subject to receive black and yellow stains from the steel tools and fire, which are removed by boiling in dilute sulphuric acid, then washing in hot water. This is done at any stage prior to the finishing touches which are put on with a burnisher.

Gold thimbles are made in the same manner as those of silver, but they are not tipped with steel; they are solid gold. Some of those which we have examined are exquisite articles of jewelry. The chasing is executed by hand engraving, and some highly artistic designs are frequently produced upon them. A great number of enameled gold thimbles used to be imported from Europe, but in the above establishment we have seen enameled thimbles rivaling those of France and Switzerland. This art, however, is but recently introduced, and, we think, is only practised on American thimbles in this establishment. Those parts of a thimble which are to be enameled are first cut out with the graver according to the desired design, so as to leave the exposed gold in *basso relievo* with the sunk parts to receive the enamel. The substance for producing the enamel is now laid in the pattern cavities of the thimble and fused, when it becomes quite fluid, adheres to the gold and forms an azure surface when cold, which contrasts beautifully with the rich yellow of the precious metal. Such articles of jewelry are about the most becoming ornaments which can be worn by the fair sex.

In some thimble manufactories, the silver is cut out from sheets into little disks, which are struck up with dies in a press into the perfect conical form at once, without a seam. This is the quickest method of making them, but more of the precious metal is wasted by the operation. Brass and common tin thimbles are thus made most economically, because the time is more valuable than the metal which is used.

We have thus given a brief description of the method of making gold and silver thimbles as the operations are performed in the establishment mentioned above, which is devoted exclusively to this business, and is the company which first commenced their manufacture in America. The prices of the thimbles made vary from eight cents up to as many (and sometimes more) dollars each.

If, according to the common estimate, there are now 30,000,000 of inhabitants in the United States, probably more than one-fifth of this number are adult females capable of sewing. We think that about 5,000,000 thimbles may be required annually by the gentler sex who have representatives in every family. The whole community is interested in the manufacture of thimbles, because they are identified with the welfare of every shirt and pair of breeches in the entire commonwealth.

A writer in the London *Chemical News* says that the new Houses of Parliament, which are built of magnesian limestone, are already crumbling into decay. He also states that the rain which falls in cities is more destructive to buildings than that which falls in the country, owing to the solvent properties of the impurities which are washed out of city air hy the rain.

THE FEED PUMP QUESTION.

Messrs. Editors:—On page 311 of the present volume of the Scientific American, I read a paragraph entitled "A Popular Fallacy in Regard to the Steam Engine," wherein it is stated there is no waste or loss of power in overcoming the resistance which the water encounters, as it is forced into the boiler against the pressure of steam. As you state, if the passages are open from the boiler to the cylinder, the pressure is transferred directly to the working piston, where it performs just as much work as was expended in overcoming the resistance of the steam to the entrance of the water; if the passages are closed, the pressure in the boiler is increased without the consumption of heat, and in either case, all the power expended is that consumed by the friction of the feed pump and its connections.

My views differing from the above, I have taken the privilege of submitting them to your inspection, hoping thereby to be more fully convinced of the correctness of your statement, or otherwise.

I would ask you if, at the time of the admission of the water into the boiler, there is not a certain amount of condensation of steam or contraction of water produced by the first mentioned coming in contact with either of the latter, as the case may be? And, furthermore, whether or not, at the time of the water's admission into the boiler, the increased pressure produced by the same is not equally and thoroughly distributed throughout its entire contents? If the above remarks are correct, there would be the greater part of the increased pressure remaining in the latter, as it would only be taken therefrom in proportion as would be the size of the cylinder to that of the boiler.

Edwin Reynolds,
Locomotive Engineer.

Crestline, Ohio, Nov. 16, 1860.

[We are much pleased with the above letter, and will reply to it in the same fair spirit in which it is written. The condensation of the steam by the cold water may be calculated to confuse some persons' minds, but it does not really affect the problem. This can be shown in several ways, one of which we will present here. Just as much as the condensation of the steam diminishes the pressure on the piston, just so much it diminishes the resistance of the steam to the entrance of the water. In regard to the second point, though the pressure is distributed throughout the boiler, it remains there to be gradually drawn down by the working of the piston, and thus it is all utilized.

Care of Dahlias in Winter.—Among the great variety of flowers which bloom until the frost overtakes them is the dahlia; and to keep them in a condition for blooming from the bulb, great care should be taken with this tender plant in winter. They will generally continue to produce flowers till their leaves and stems become blackened by frost. As soon as this is the case, they should be cut down nearly to the surface of the ground; and the first dry weather that occurs, the tubers should be taken up in the morning, and left exposed to the sun during the day. In the evening they should be taken to a dry, airy place, where they will be safe from frost, and kept there until they are dry enough to have all the soil removed from them, which may be done with a soft brush. They must be then buried in sand, saw-dust, or some similar material, and deposited in some place where they can be kept dry; the great objects being dryness, security from frost, and a moderately cool temperature; or they may be kept in a dry cellar, and should be started in hot-beds or pots in warm places as early as possible in the spring, and transplanted to some hot sandy garden as soon as the frosts are past in the spring. They require a good exposure to the sun, and will not bloom in the shade.

Steam on Canals.—The Illinois and Michigan Canal, which connects Lake Michigan with the Illinois river, is 60 feet wide and 6 feet deep, with locks 105 feet long and 17 feet wide. At one time, there were half a dozen steam propellers running on this canal, but they have all been laid aside. No difficulty was experienced from the washing of the banks, but the machinery and fuel occupied so much room as to leave too little for freight, and when the propellers were used for towing, the boats were too apt to be blown ashore by side winds.

TALK WITH THE BOYS.

No. 7.—The Way Coal Beds were Formed—A Glance into the History of the Earth, Which was Written by Nature Herself, and Sealed up in the Rocks.

"Good morning, father; we should like to hear the explanation which you promised us of the mode in which carbon was packed away in the hills before man was created, to be kept for our use."

"There is no doubt that anthracite and bituminous coal, now buried in such solid masses in the bosom of the earth, once formed a portion of growing plants. It is ascertained that these plants consisted to a considerable extent of mosses, which, as they died and decayed, formed first peat beds, then lignite (a substance half way between wood and coal), then bituminous coal, and finally, when the process was continued far enough, the hard anthracite."

"How could they change from a plant into stone coal?"

"Simply by having a portion of their substance carried away. All plants consist principally of four elementary substances—oxygen, hydrogen, nitrogen and carbon, and three of these—oxygen, hydrogen and nitrogen—take the gaseous form at ordinary temperature, while carbon does not. If you take a log of wood, or any other vegetable substance, and put it into a close oven so that the air cannot come to it, and heat it, the oxygen, hydrogen and nitrogen which enter into its composition will be driven off, and the carbon will remain. This, as I have explained before, is the philosophy of burning charcoal. You have seen a coal pit, have you not?"

"Where did the heat come from to roast the peat bogs and turn them into coal?"

"The earth on which we live is a mass of molten matter, with only a thin crust cooled on the ontside, and some geologists suppose that it was this central heat of the earth which effected the change of converting the ancient peat bogs into coal. But the substances of which plants are composed are not held together by their own chemical affinity for each other, but they are drawn into their union in the plant, and maintained in it by the mysterious power of vegetable life, and when this life ceases the substances fall asunder spontaneously. The rot and decay of vegetables is simply this falling asunder of the substances of which they are composed. It is now the prevalent opinion of geologists that the conversion of the peat bogs into coal was not effected principally by the internal heat of the earth, but that it resulted from this falling away and gradual escape of the more volatile portions, leaving the carbon behind."

"When was this done?"

"The number of years ago in which any rock was deposited at the bottom of ancient seas, it is impossible to ascertain, but we can learn the order in which they were deposited by seeing which one is on the top of another in the series. Coal has been formed to some extent during a very long period, and it is still in process of formation, being found in all stages, from the growing moss to the hardest anthracite. There is one period, however, in which most of the coal was formed, called for this reason, the carboniferous period. The lowest rocks, and hence the oldest, it is manifest received their present form when in a melted state, and they are therefore called igneous or plutonic rocks. Granite is a plutonic rock. Next above these are the metamorphic rocks, which were evidently first deposited in layers at the bottoms of seas, and were afterwards crystallized by intense heat. Gneiss, or stratified granite, is a perfect specimen of this class of rocks. Over these we find deep beds of rocks which were deposited in level layers and which have not been crystallized by heat. These rocks are full of the fossil remains of plants and animals, and in the oldest rocks the organisms are the most simple in structure, gradually becoming more complex as we ascend in the scale. Some of the earliest animals were scarcely more than simple sacs, being wholly a stomach. Others were attached to the spot on which they grew, so nearly resembling plants that it was very difficult to decide whether they were plants or animals. The animals which were subsequently created were of a higher order, some having mouths and fins, and others additional organs of sight and of hearing, till at last appeared man, with his lungs, liver, and numerous other organs, with his skilled right hand and cunning brain, all so "fearfully and wonderfully made." There is no doubt that the earth was swarming with animals of the lower orders through periods of inconceivable length before man was created. There is also the same progressive improvement to be noted in the creation of plants. At first appeared the cryptogamia, plants like the ferns and mosses without any blossoms or fruit, then palms and pines, and finally the apple tree and the double rose. Now, at the time when most of the coal was deposited, the highest order of animals in existence were frogs and lizards. There were no quadrupeds nor any animal that secreted milk for the support of young, the mammalia, as they are called by zoologists. The ancient peat beds, which are now our coal quarries, were formed mostly of mosses, ferns, &c., but over these peat beds there were dense forests of trees of many kinds, but consisting principally of palms, pines and gigantic ferns. The remains of these trees are now found all turned to stone, forming roofs over the coal beds of curious and beautiful network. The trunks are generally flattened and the roofs are inclined at all angles. If you go into a coal mine and ask one of the experienced miners where his roof is, he will tell you promptly; sometimes it is over his head, sometimes at the right hand and sometimes on the left, occasionally being under his feet. For this earth of ours, as it cooled down from the hot state in which it once existed, has been twisted and wrinkled with terrible contortions. Some of the coal beds have slowly settled down beneath the level of the sea, where they have remained long enough to have thick beds of shells and sand deposited upon them, they have then been slowly raised up, and sometimes again submerged; all these movements, with the pressure and heat, combining to expel the volatile portion of the vegetable matter, and leave the coal more and more nearly pure carbon. It has been found by careful analysis that—

Wood contains	50 per cent of carbon,	48 of water and other volatile matter.	and 2 per cent of ashes.
Peat.....	57 "	38 "	5 "
Asphaltum.....	78 "	19 "	3 "
Perfect lignite..	69 "	28 "	3 "
Bituminous coal.	61 "	35 "	4 "
Semi-bituminous	77 "	15 "	8 "
Best anthracite..	92 "	5 "	3 "

Having now completed the circuit which carbonic acid makes in the laboratory of nature, we might dismiss it; but before doing so, I want to follow it with you through our own bodies, and see its operations in our hearts, lungs and arteries; a branch of the subject which you will find the most interesting of any.

PRACTICAL DIRECTIONS TO ENGINEERS.

We continue our extracts from King's work on the Steam Engine.

How to proceed when all the Feed is on and the Water does not Rise in the Boilers.

It sometimes happens that when all the feed is on, and the feed pumps are apparently performing their usual duty, the water does not rise in the boilers, but either retains its level at the time the food was put on, or gradually falls. In this event, one of two things must be manifest—either that the water does not enter the boiler, or if it does enter, is escaping through some other orifice. The first thing, therefore, to do, is to examine the check valve to see if it is in operation. This can be done by applying the ear to the chamber, to ascertain if the valve rises and falls, at each stroke of the pump, and also by applying the hand to the pipe, immediately below the check valve, in order to ascertain if it be cool. If these are found to be all right, examine the blow-off cocks, and all other water connections with the boilers, to ascertain if they be closed; some of which, in all probability, will be partially open, but if they should all be found closed, the pump must be pumping air into the boilers instead of water. The next step would therefore be, to examine the pump and induction pipe, in order to ascertain and stop the air leak.

Upon examining the check valve, should it not be found in operation, the next step would be to examine the pump, to see if it was hot; also relief and pump valves, to see if they were gagged; and lastly, the eduction pipe, to see if it were burst—either of which causes would prevent the pump from delivering water. A feed pump may get hot from four causes:—

First, There may be so small a quantity of injection water used as to cause it, when delivered to the hot well, to be of sufficiently high temperature to heat the pump.

Second, Friction, occasioned from muddy water, or tight packing.

Third, The check and delivery valves may be caught up or very leaky, allowing the hot water from the boiler to run back to the pump.

Fourth, External application of heat, the pump being situated near the boiler or other hot body.

A feed-pump cannot deliver water when hot, for the reason that the vapor constantly generated within it, by its elasticity prevents the induction valve from opening and admitting water.

Should the feed pipe burst, it can be repaired temporarily by wrapping it with canvas coated with white lead; this being secured by strong twine or marline, wound closely around the pipe the full length of the canvas.

Should the pipe be split open for a considerable distance, it might first be closed with wood or iron clamps, as came most convenient before applying the canvas and twine.

Foaming.

Foaming, or priming, as it is sometimes termed, is violent ebullition or agitation of the water, occasioned by an undue relation of temperature between the steam and water. Thus, supposing a large quantity of steam to be suddenly taken from the boiler, the pressure of steam is immediately reduced below what is due to the temperature of the water, and the result is a sudden rising up of the water from all parts of the boiler. Foam can, therefore, be defined to be a mixture of steam and water. Boilers are known to be foaming when the water does not come out of the gage cocks solid, or when there is a considerable agitation of the water in the glass gages.

To suppress foaming, put on a strong feed and blow off, cut off shorter or partially close the throttle. Oil or melted tallow, injected into the boilers through the feed pumps will also prevent foaming, but these are somewhat expensive expedients.

Boilers constructed with insufficient steam room are most likely to foam, because at each stroke of the piston a large proportion of the steam is taken from the boiler, and the pressure therefore becomes materially reduced. Boilers also constructed in such a manner as to prevent the easy escape of steam from the surfaces on which it is generated, are likely to foam. Thus, supposing there be a large amount of heating surface on the crowns and other parts towards the bottom of the boiler, and that the steam generated on these surfaces in consequence of coming in contact with the flues, tubes, braces, &c., can find but a comparatively small exit to the surface of the water, the result will be, that where it does escape, it will force a large body of water up, mixing it with the steam.

To carry too much water in boilers will cause them to foam by reducing the steam room. Running from salt to fresh water, or *vice versa*, will also cause foaming; in the former case, because fresh water boils at a lower temperature, but a satisfactory explanation of the latter case appears to be difficult to arrive at. The boilers of sea steamers, when running in muddy rivers, usually foam considerably.

It sometimes occurs, while the boilers are foaming badly, that the engines have to be stopped in order to take soundings, or from other causes. Now, the first thing after stopping the engines, in any case, is always to try the water; for it will mostly always be found to be lower when the engines are standing still than when under way, but when the boilers are foaming, it is of the highest importance to try immediately the hight of the water, for as the foaming ceases after the engines are stopped, it may happen that the water has fallen entirely out of the gages and left the flues, in which event, if the engines were going to be started again in three or four minutes, the better plan would be to open the safety valve to keep the water foaming, so as to keep the flues covered, and when the engines are started again to put all the feed on. But if the engines were going to stand still for a considerable time, blow off a portion of the steam, if it be too high, dampen the fires a little, and put on the auxiliary feed.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, Nov. 15th, the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; Professor Mason presiding.

MISCELLANEOUS BUSINESS.

Advertising Schemes.—Mr. Johnson laid on the table an advertising book of Davids & Co., stationers, on the "History and Manufacture of Ink." The book is a beautiful specimen of typography and binding, and many people would not hesitate to give a dollar for it.

The President—The art of advertising is now associciated with all successful business operations. New methods of advertising are among the most important of inventions.

The regular subject—"Preservation of Wood Exposed to the Weather"—was here taken up.

DISCUSSION.

The President—The most venerable objects known are trees. The large trees of California are as old as the history of Adam, and on Mount Lebanon are cypress trees which were venerable in the days of Solomon. During all those long years these trees have been cumberers of the ground, yielding nothing servieeable for the use of man but the simple material of wood for timber. The elemental cell growth of plants and animals is substantially the same.

Mr. Johnson—Physiologists say that we are dying every moment. It is possible that the elements of trees, as well as of animals, is constantly dying out and being replaced.

Mr. Stetson—The Old Colony Railroad of Massachusetts tried many experiments on the preservation of timber, but no new plan was adopted. What was the reason?

The President—The materials used in the experiments were not good or were too costly. The change of directors by elections also interfered with the prosecution of experiments.

Dr. Stevens—The ties of the Old Colony Railroad were "Kyanized" by the use of sulphates of iron and copper. The result in the preservation of the wood was successful, but the timber selected being the light wood of white cedar and larch, could not hold spikes; and, besides, the salts in the wood caused the spikes to rust or converted them into sulphate of iron. The great age of the large trees of California—the Sequoia and Wellingtonia—has been overrated. A segment of the annular ring has been counted, and the remainder calculated from the diameter of the tree. An eminent living botanist has counted all the annular rings, and found the oldest of the trees but a little over 2,000 years old. They must, however, be very noble and venerable objects, being a third higher than the tallest pines of New York—over 300 feet in hight. Timber buried beneath water will be preserved for an indefinite length of time, the water preserving it from the action of the atmosphere. Certain portions of the coast of Jersey are in a state of oscillation; and by this process swamps are buried. In these buried swamps are large quantities of submerged white cedar, lying at the depth of 30 or 40 feet; how long these trees have been buried, we have no means of knowing, but we know that the timber exhumed is as fresh and pure as if cut from living forests. The value of the swamp is reckoned by the amount of the buried timber. In Canada, there are quarries of red cedar which are buried under the drift, from whence large quantities have been obtained for fencing and railroad purposes. In all these cases the timber has been well preserved.

The President—What kinds of wood give the most creosote?

Dr. Stevens—Creosote is obtained from wood, peat and coal by destructive distillation. Birch and other woods which yield the most sap give the largest product of creosote. Ordinary decay or rot of vegetable fiber is a process of combustion, slow indeed, but yielding the same chemical products. Wood is built up of a compound of hydrogen and carbon. The hydrogen is obtained from the water absorbed from the earth; the carbon is derived from the decomposition of carbonic acid gas which is in the atmosphere. To these may be added certain earthy matters, such as potash and silver; these are held together by the vital power of the tree when growing. After the tree has been felled and converted into timber, the atmosphere supplies oxygen which combines with the carbon, forming carbonic acid gas. This gas is the product of combustion, which is but a quick dissolution of vegetable fiber or of decay, which is but a slow process of dissolution. Now, whatever will protect wood from the presence of the atmosphere, which supplies oxygen (the main element of decay), will preserve wood. Sulphate of iron, of copper, the acids, heat, charring, creosotes and numerous other processes, by consolidating the sap, albumen and woody fiber, will serve to preserve wood from decay Creosote is probably the cheapest material. This article can be furnished for five cents a gallon, and, if wanted in large quantities, can be supplied at cheaper rates. Certain coals yield more of this article than others; coal, undoubtedly, is the most economical source. If, in addition to the use of creosote, coal tar is applied externally as a paint or varnish, by closing the pores of wood, preventing access of the atmosphere to the inner parts, this latter substance acts as an adjuvant to the former.

The President—Does timber last in proportion to its density?

Dr. Stevens—Undoubtedly it does, if by density we understand its specific gravity, and not merely hardness of the wood. Oak, especially live oak, has great specific gravity; in this wood, the fiber is the most condensed. In chestnut, hickory, black walnut, elm and other woods, a portion of the fiber is highly condensed and another portion is not; some portions are so porous that the breath can be forced through the pores. This porosity of wood gives access of oxygen to the inmost part of it, and consequently induces decay. Maples and beach are very hard wood, but the fiber is not equally condensed through the whole of the mass, nor so highly condensed as in oak.

The President inquired how sap contributed to decay, and if the decay commenced in the inner or outer portion of the wood.

Dr. Stevens answered that sap might be considered as but a solution of wood in water; of immature wood, or the material for wood; and, like all immature organizations, decayed early.

Mr. Garbanati inquired if certain trees always commence decaying at the heart first, and if other wood did not commence at the bark.

Dr. Stevens answered that some trees, as the sycamore or buttonwood, commence at the heart, and the decay proceeds toward the alburnum, so that often a large tree of this species would be entirely hollow, with a mere shell of live wood under the bark.

Mr. Stetson—Salt is much used by ship carpenters to preserve ship timber, especially from dry rot.

Mr. Koch—Under one of the public buildings in Germany is a cavern in which dead bodies have lain 400 or 500 years. These bodies are still perfectly preserved—the flesh is like leather. Scientific examination has recently determined that this preservation is due to arsenic, and it is well known now that arsenic will preserve indefinitely all kinds of animal substance. And it may be that arsenic will be found useful for preserving wood. I would recommend, as an experiment, that wood be immersed in water until it sinks, and that then it may be taken out, the water extracted, and finally, that it be treated with a small dose of arsenic.

Mr. Garvey—Wood, to last long, should have considerable thickness and rigidity. Wood is always weakened by bending; the fibers are separated when the wood is bent, and never resume their natural position. If water gets into wood, there must be provision for its free egress. Metallic salts are not advisable for the preservation of wood, for the reason that a galvanic circle is invariably formed whenever metallic bolts, nails, &c., are used. The fact that arsenic is a deadly poison to all animals is sufficient to exclude its adoption.

Mr. Dibben—Mr. Stevens, of New Jersey, has tried various of the plans proposed for the preservation of wood, but with unfavorable results. When the processes were successful in preserving the timber, it was generally found that the cost was as much as for the timber. Where wood is dearer than in this country, the metallic salts have grown out of use. On the Great Western Railroad, however, much creosote has been used, and creosoting, at the present time, is approved. After three years it is found that railroad ties are better than when first laid; they are firmer and tougher, and the surface is more solid. The spikes and bolts were free from rust. In a tie there are about three cubic feet, and the cost of creosoting is about twenty-one cents.

The President—It costs about fifty cents each to put in new ties.

Mr. Dibben—In England it is said that creosoted ties outlast three which are not operated on.

Mr. Veeder—More care should be taken in the original selection of the wood. Locust is an excellent and thrifty wood, and I think it desirable that it should be planted and grown expressly for use. It is not so strong as oak. The durability of wood is not exactly proportioned to solidity.

The President—Hickory is a heavy wood, but does not last long.

Mr. Veeder—Heart wood lasts longest; and hence heavy timber is to be preferred.

The President—Oak grown from the stump oftenest begins to decay in the heart.

Mr. Churchill—In England, birch is known to yield the greatest amount of pyroligneous acid. It is also believed there that wood, to be durable, must be cut in the Spring, and that trees grown on the north or shady side of a hill are more solid, for the reason that the growth is slower.

The President—Does it follow that the wood on the north side of a tree is soundest?

Mr. Churchill—I suppose so. I have seen the ends of beams of elm encased in zinc caps, which were thus considerably protected from moisture. It is found that superheated steam contracts the fiber of wood and makes it more dense.

W. H. Johnson—The trials of creosote extend over a period of twenty-two years. Burnett, in a lecture before the Society of Arts, reviews the various processes of wood-preserving, and concludes that creosoting is the most practicable. Bitumen is much used for protecting iron from rust; an iron pipe covered with it was found perfect after being buried twenty years. The Reading Railroad Company, of which I spoke last week, propose to use the coal tar creosote. This creosote is only a secondary or waste product, and can be furnished for about seven cents per gallon; crude coal oil brings twenty or thirty cents.

Mr. Dibben—This material, in England, is generally produced in the process of coking.

Mr. Veeder—In Ohio there is a great deal of coking done, but no products are used beyond the coke.

Mr. Stetson—We should be careful to observe if any of the preservative processes affect the useful properties of the wood. If all of the wood except its elasticity be preserved, it would be of little use for some purposes.

Mr. John Johnson laid on the table pieces of wooden beams which he had collected from buidings now being taken down in Broadway and Duane-street. Some of the buildings were erected twenty years ago. The wood was thoroughly rotten, and some of the beams could not support their weight.

The President—The transportation of railroad timber is often equal to the cost of the wood, and if creosoting will preserve it two or three times its ordinary duration, it must be economical.

Subject for next week—"Sewing Machines."

CURIOUS COLOSSAL STATUE.—On a hill near Arona, overlooking the Lago Maggiore, in Northern Italy, there is a statue of St. Charles Borromeo, 70 feet in hight, mounted upon a pedestal which rises 30 feet above the top of the hill. It was erected in 1624, and is a very wonderful work of art. The pedestal is of stone, but the statue is formed entirely of plates of bronze and copper riveted together, presenting a life-like appearance, rivaling many small works of sculpture. The expression of the features, the attitude of the body, and the arrangement of the drapery evinces great genius and artistic skill.

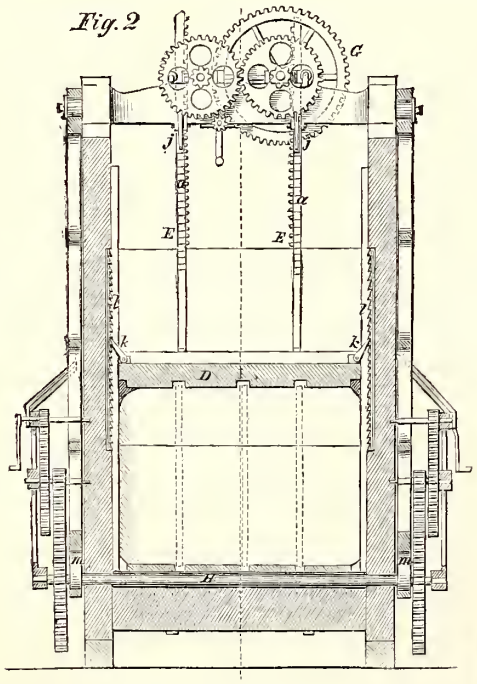
THE effect of climate on the human system is shown in a striking manner by the inhabitants of Australia, who, in the course of two or three generations, lose the corpulence characteristic of Englishmen, and become a tall, gaunt, raw-boned race, like the inhabitants of our southern States.

IMPROVED COMBINATION PRESS.

In pressing cotton and similar articles into bales, the power required rapidly increases as the size of the bale diminishes, consequently, if a press is so geared as to multiply the power sufficiently for the latter part of the operation, the plunger moves more slowly than is requisite during the earlier part of its descent, thus consuming time unnecessarily. To enable the work to be more rapidly performed, A. Randel, of this city, has invented the press which we here illustrate, in which the follower is run down through most of its descent by gearing which multiplies the power 72 to 1, and then gearing is brought into play to finish the operation, which multiplies the power 600 to 1.

In the annexed cuts, Fig. 1 is a perspective view of the press and Fig. 2 a vertical section. The gearing attached to the crosshead at the top of the press is first employed to run the plunger down through the principal part of its descent. The cotton or other material to be pressed is placed in the box, the door being removed for this purpose, as shown in the cut. The door being secured in its place, the plunger, D, is forced down by turning the crank, C, and thus turning the gear wheels which mesh into the racks upon the stems, E E, of the plunger. The stems are prevented from rising by pawls, *j j*, which catch into ratchets, *a a*, secured to the sides of the stems. When the plunger has been forced as far down as can be done by the power applied through the medium of the gearing at the top of the press, the gearing at the bottom is brought into play, to complete the compressing of the bale. This operates through an eccentric to draw down the crosshead a little farther with very great force. The strong metallic straps, G G, at the sides of the frame, are rigidly secured at the top to the crosshead, which has a sliding motion up and down through a short distance in the upper part of the frame, and the shaft, H, with the eccentrics, *m m*, upon it, passes through the straps, G G, at the bottom. The

Fig. 2

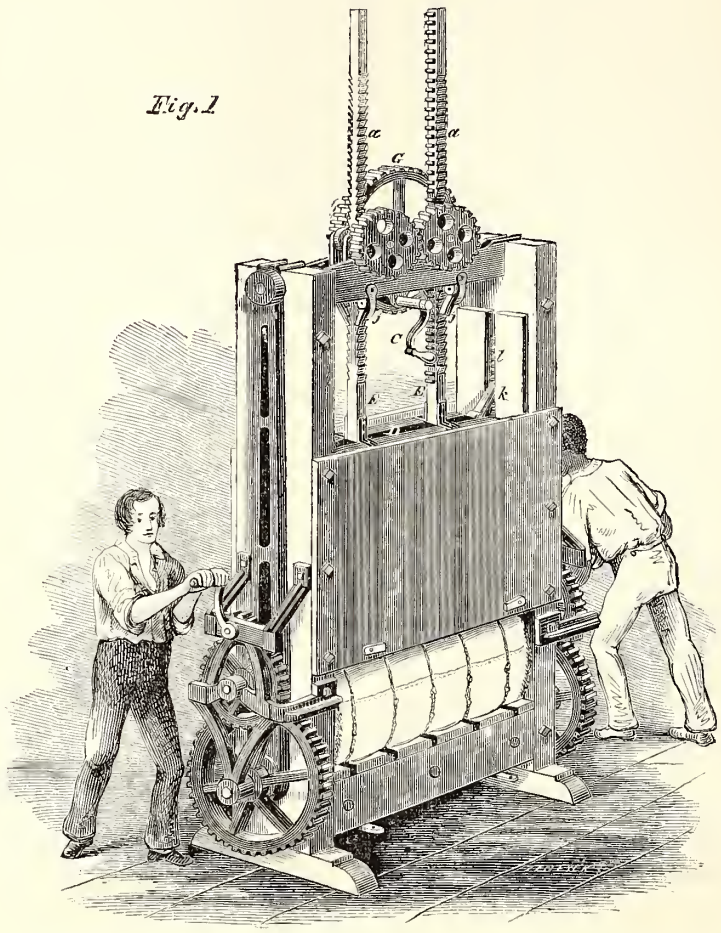


plunger being held down by the pawls, *j j*, the crosshead is drawn down by turning the eccentrics, *m m*, through the medium of the strong gearing at the bottom of the press. When the plunger is carried as low as desired, it is held in place by the pawls, *k k*, catching into the ratchets, *l l*, as shown in Fig. 2, while the bale is being roped and its covering is being sewed.

The patentee says that this press has been proved by actual trial to work in every respect, and to accomplish far more work by the same number of hands than the presses commonly in use heretofore, in which the plunger has a uniform motion.

Patents for this invention have been secured, through the Scientific American Patent Agency, both in this country and Great Britain. The American patent was granted Oct. 23, 1860, and further information in relation to the matter may be obtained by addressing W. A. Cromwell, agent, at 461 Fourth-street, this city.

Fig. 1



RANDEL'S IMPROVED COMBINATION PRESS.

GRATZ & LLOYD'S IMPROVEMENT IN DRY GAS METERS.

The invention here illustrated is an exceedingly simple one, but the owners of the patent say that the economy effected by it in setting dry gas meters is at least 75 per cent, thus again demonstrating the value of even a trivial improvement.

The invention consists simply in placing the inlet at the bottom of the meter and the outlet at the top, thus dispensing with side tubes. A, Figs. 1 and 2, repre-

Fig. 2

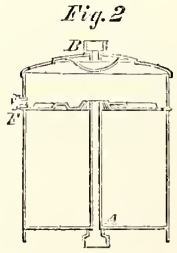
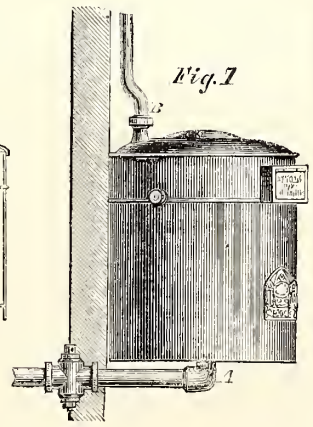


Fig. 1



sents the inlet placed at the bottom of the meter, and B the outlet placed at the top. A cup is fixed on the inside to catch and retain any liquid resulting from condensation and thus to prevent it from discharging itself on the valves, and being carried to the inside chambers of the meter. At F is an oppening closed by a thumb-screw, by which any liquid deposit in the gallery is drawn off.

The patent for this invention was granted to Robert H. Gratz and Charles C. Lloyd, of Philadelpha, Pa., Oct. 23, 186 , and further information in relation to it may be obtained by addressing the owners of the patent, Messrs. Code, Hopper & Gratz, corner of Fifteenth and Filbert streets, Philadelphia.

INTERESTING FACTS.

Among the items collected by the Paris correspondent of the London *Photographic News* are the following:—

M. Saint Edme has made some interesting experiments on the passivity of iron. When a piece of this metal is immersed in ordinary nitric acid, it is violently attacked by the latter; if it be withdrawn, the adherent acid continues its action. When the acid has disappeared from the surface of the metal, it is again immersed in the nitric acid; the coating of rust is dissolved by the liquid, and the iron becomes dead white, but is no longer attacked—it has become passive. If it be rubbed, it again becomes attackable, and can be again brought to the passive state.

It is probable that the iron, when exposed to the air, imbibes some acid, forming a layer of sub-oxyd of iron, which is not attackable by nitric acid (this sub-oxyd is formed only in the presence of air, for when the iron is not withdrawn from the acid the action of the latter continues). Upon re-immersing the iron in the liquid the coating of per-oxyd is re-dissolved, but the film of sub-oxyd protects the iron against the action of the nitric acid; but if this film be removed by friction the acid resumes its action.

If the iron covered with the acid be made red hot, and immersed in the acid in that state, it is not acted upon by it, the rust disappears in the liquid, and the iron becomes dead white: it is passive. We can then rub it without its losing its passivity; the coating of sub-oxyd appears to have become very adherent to the iron, and can only be removed by sand paper or by the file.

In many of the arts the rapid and economical production of carbonic acid gas is an affair of much importance. M. Maumené has suggested the following method, which has much to recommend it:—In a retort containing about 100 lbs. of good chalk or whiting, heated to redness, inject a small finely divided jet of steam. The disengagement of the gas takes place immediately; the quantity of gas given off by the tube of the retort is nearly a gallon per second, or 1,500 gallons an hour. Although the gas is given off so rapidly and continuously, it is quite cold. It is only necessary to keep up the steam. To obtain 2,000 gallons of gas requires the evaporation of only 4½ gallons of water. Its purity is proved by the fact that it is entirely absorbable by potass.

M. Gersteim's malleable metallic alloy seems likely to render important services to the arts. It is simply an amalgam of chemically pure copper with mercury, which, in its plastic condition, possesses the property of serving as a solder for metals, and as a cement for glass and porcelain, to which it adheres strongly. At the expiration of ten or twelve hours it becomes sufficiently hard to take a polish, like brass or silver.

A NEW steam passenger car has been completed and just exhibited on the Pittsburg road. It is of iron, is 77 feet in length, and has a baggage room, an apartment for the mails, and accommodations for 94 passengers, together with an engine, all under the same roof. An average speed of 45 miles an hour was made.

WHALE oil expands so much by increase of temperature, that a quantity which measures 100 gallons at 32°, if warmed to 68°, will measure 102 gallons.

Scientific American.

MUNN & COMPANY, Editors and Proprietors

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

☞ See Prospectus on last page. No Traveling Agents employed.

VOL. III., No. 23....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, DECEMBER 1, 1860.

NATIONAL AND MAILED SHIPS.

HE great outward elements of national wealth and power are agriculture, commerce and manufactures. Commerce may be taken as an exponent of agriculture and manufacturing industry, because where there are no industrial products to exchange, of course there can be no commerce, and *vice versa*. Activity in shipbuilding and an increase of merchant vessels are good signs of national prosperity. We have made steady progress in nautical architecture and in the increase of our merchant fleet. At present, however, business is not brisk in our dockyards, but it has been very good during the past year, in which no less than forty-two new vessels have been built in New York alone, and an addition of twenty-six thousand tuns made to our commerce, valued at four million two hundred thousand dollars. The fame of our naval architects is world wide, and the models of their vessels are universally regarded as being not only unsurpassed, but unequalled for speed and beauty. We have built steam frigates, and sailing vessels, and steamboats for different governments and peoples, and we have now a mercantile marine of no less than five million tuns, which is only rivaled, but not surpassed, by that of Great Britain. Now, while we have done so well in efforts of private enterprise, we have a different story to tell of our national marine—our naval efforts. It is a fact that at the present moment we have the smallest and most inefficient fleet of any mercantile nation whatever. Great Britain has 538 war steamers armed with 10,920 guns; France, 280 steamers and 5,678 guns; Spain, 55 steamers and 500 guns; and little Holland has 42 steamers and 600 guns, while the United States has but 38 steam vessels with 458 guns. Of these, there are only 16 which can really be called vessels of war, the others being totally undeserving the name. And this is all the navy which we have for protecting 10,000 miles of sea coast, and 5,000,000 tuns of merchant shipping—some of which may be seen on every sea and in every notable port in the world. It is generally considered that a large mercantile marine requires a large and powerful naval support to protect it in cases of necessity, and such cases frequently arise very suddenly and when least expected. We are sadly behind hand, and ill provided with national vessels. Within a few years past we have had seven noble steam frigates built, and these we had supposed would be equal to any of their class in the world; but a competent judge—Mr. Donald McKay, of Boston—who is now in London, has sent a letter to the *Commercial Bulletin*, in which he states that a new epoch has commenced in naval construction, which will render our very best frigates obsolete for effective service. In France and England they have just built several, and are now constructing a number more of mail clad war ships, of which Mr. McKay says: "It is at this day generally acknowledged that no naval power, which will not lose entirely her authority on the seas, should be without a number of these frigates." And he affirms that, with a few of such ships, and twenty screw line-of-battle ships, with as many more frigates, our whole navy could be cooped up by either England or France within the shelter of our land batteries, our whole coast blockaded and our merchant fleet perhaps entirely annihilated. This comes as a voice of warning, to which those who are in authority in naval affairs would do well to take heed. We direct public attention to this question at present, because we have neither an iron plated vessel in our navy nor suitable plates to cover the most diminutive gun boat in the whole of our dockyards. We would recommend a supply of material to be obtained as soon as possible for coating some of our frigates, and advise the use of puddled steel plates instead of iron, as the former are one-third stronger than the latter. Although mail clad frigates can be pierced by solid pointed shot striking several times in the same place, they have effectually resisted shells, and these are the most destructive missiles in naval warfare. This is a subject which demands instant attention. "To be forewarned is to be forearmed." We must have a number of national mailed ships, if we desire to preserve our authority on the seas.

AN EFFORT TO DEFEND THE NEW MOVEMENT AT THE PATENT OFFICE.

An anonymous correspondent has published, in the *Constitution*, what appears to be intended as a sort of defense of the recent action of the Commissioner, in establishing a board of revision in the Patent Office. Its appearance in the government organ, together with certain other ear-marks, gives to this communication something of an official air, and yet it is very evident to us that Commissioner Thomas had no hand in its production. He is a man of too much good sense to be guilty of putting forth so silly and senseless a mess of verbiage. Our columns are open to a dignified and sensible response to any position we have taken against the new movement of the Commissioner; but we cannot degrade our columns to personalities, which can neither befit nor benefit the cause.

The writer says, "when the laudable determination of a high public functionary to enforce the faithful execution of the provision of the statute is to be virulently assaulted, under the cover of the public good, when in reality only private interests and considerations can be at stake, then it is time that such conduct should be publicly rebuked." Very good, very well spoken; but the position here assumed is absurd and ridiculous. If any one will turn to our article on page 313, of our present volume, against which this fulmination is sent forth as a reply, it will be seen at once that we have not "virulently assaulted this high public functionary." On the contrary, we gave him credit for the best intentions, and criticised only his *official acts*, which we claim a perfect right to do under all circumstances. If there has been any virulent abuse in this matter, it has been heaped upon us by this assumed mouthpiece of the Patent Office, who seems not to know the difference between virulent abuse of the man, and a frank commentary upon his official performances.

The communication announces the Commissioner's intention "to break up the licentious practice of granting frivolous patents;" and the means whereby this reformation is to be brought about is by the vigilance of the new board of revision. And yet the same astute writer informs us "that the board, with the exception of one application, have kept no case back which was passed by the Examiner for that issue." This is virtually saying that the new board is not only a useless appendage, but that licentiousness does not form a part of the ordinary practice of the Examiners.

If the Examiners are guilty of the reprehensible conduct charged against them, then the Office ought to be rid of them at once, and their places filled by persons competent to discharge the duty in a virtuous and proper manner. But we are happy to have it in our power to bear testimony against this charge, and to deny the slanderous imputation thus attempted to be cast upon the Examiners by the writer in the *Constitution*. The examining corps of the Patent Office we believe to be free from all taint of the "licentious" practices charged against them. They grant comparatively few frivolous patents—no more than the Office will always feel compelled to issue until it becomes a mere bureau of record.

It seems to us that the author of the article in the *Constitution* has cast a severe reproach upon the Patent Office by his insinuations. Not satisfied with this "virulent assault" upon the Examiners, the writer rushes on to say that "had the firm of the SCIENTIFIC AMERICAN simply stated that the *intentions* of the Commissioner will render the Office itself odious to the great body of our people, there would be no necessity of gainsaying such a confession."

Indeed! Here is a cat in the meal tub! Well, we did not design to impute any such motive to the Commissioner. We had no idea that his "intentions" were aimed at such a result. The most that we charged was that the new arrangement was likely to bring the Patent Office into odium. The assertion thus innocently made no doubt does injustice to the intentions of the Commissioner. We thought and still think, notwithstanding the assertion of the writer, that the motives of Commissioner Thomas were laudable; that he desired only to promote the best interests of the Office and its numerous patrons. We simply wish to re-affirm that we think the Commissioner is mistaken; that the new policy is retrograde in its tendency, and a departure from that which made the Office not only popular but brought to it prosperity and public approval. If, however, any reliance can be placed on the assertions of the writer in the *Constitution*, the "check" in question is more imaginative than real, and no great good or harm will come of its operations.

THE COMPLETION OF THIS VOLUME.

The third volume of the new series of the SCIENTIFIC AMERICAN is drawing to a close, and the large proportion of our subscribers who have not been familiar with the paper from its commencement may be interested in some of the facts of its history. The first number of the SCIENTIFIC AMERICAN was published on the 28th of August, 1845, and from its adaptation to the wants of the great mass of American manufacturers and mechanics, as well as the more enterprising and intelligent of the farmers, it has experienced a steady growth, until its circulation now far surpasses that of any similar publication in the world. During this long career of steady prosperity, it has seen a host of rivals start into existence, struggle for a brief period, and then perish for want of support. Within a few months, two of the strongest of these rivals which have ever been started—the *Scientific Artizan*, of Cincinnati, and the *Practical Mechanic*, of this city—have quietly given up the ghost. Though our career has been one of satisfactory prosperity, it has not been free from the contests that attend the course of every independent journal. Our opinions have been frequently assailed—sometimes through ignorance, and sometimes through the folly of some young cotemporary, who desired to draw us into a controversy for the sake of getting itself out of obscurity. Some years ago, a centrifugal engine made its appearance, and upset even the science of many of the learned professors of our universities; afterwards an electric light blazed forth in great effulgence, and went speedily out under a wet blanket; and still later, the caloric ship sailed out under loud huzzas from the press, accompanied with all manner of predictions, that made that useful old motor—steam—almost hide its diminished head. Upon all these matters, involving important scientific questions, this journal has expressed opinions, the truthfulness of which time has fully vindicated; and even now we are by no means free from similar antagonisms. We certainly lay no claim to infallibility, but in relation to the positions which we have recently taken on the questions of the Water Gas, Giffard's Injector, the Gyrascope and the Feed Pump, we await with confidence the vindication of time and of thorough investigation.

Early in the year 1859, finding our circulation so largely increased, and having an income from our professional business that would justify the enterprise, we determined to enlarge our paper to nearly double its former size; and consequently commenced, on July 2, 1859, the publication of the new series. Each number of the SCIENTIFIC AMERICAN now contains 16 pages, and a volume comprises between 800 and 900 pages, with 500 to 600 wood engravings, executed in the best style of the art. The matter, consisting of full accounts of the latest improvements in all arts and trades, with all interesting discoveries in science, is gathered from every quarter of the globe by an industrious corps of editors, who translate and prepare it in the most careful manner for our readers. This great mass of reading and illustration constituting a full, readable and in-

telligible cotemporary history of the improvements of this most rapidly improving of all centuries, is furnished to subscribers for the small sum of $2, and in clubs of 20, for the still smaller amount of $1 40.

The ability to offer so valuable a property for so small a price is only possible as the result of a complex organization which has been the growth of time. Our enterprise is interwoven with the industrial and inventive activity of the country, and it is our aim to make our paper the store-house for all new and correct ideas which are constantly coming from the most fertile intellects throughout the world. It is not strange that so many avail themselves of the opportunity to procure this large supply of intellectual wealth for so trifling an outlay.

THE FIRST AMERICAN LOCOMOTIVES AND RAILROADS

At the one hundred and seventy eighth anniversary of the landing of William Penn, which was held in Philadelphia on the 8th ult., a disputed question regarding the first engine that was run upon an American railroad was brought up in the course of a speech made on the occasion by Dr. Dickson. He stated that the first locomotive trip made on an American railroad was on the Charleston and Hamburgh Railroad (S. C.), and that the locomotive which made it was built at the West Point (N. Y.) Foundry. Mr. Gerard, who was present, as we learn by the *North American*, said this was not so ; that the first locomotive actually run in America was built in England and placed on a Pennsylvania railroad. This is a historical matter in railroad engineering which can be easily settled, as those who were engaged in the first locomotive efforts in our country must still be among the living, and can furnish the conclusive testimony as to dates and circumstances. We have always entertained the opinion that the Mohawk and Hudson River Railroad, between Albany and Schenectady, N. Y., was the very first on which locomotives were regularly run in America. Mr. D. Matthews, now of Philadelphia, the first locomotive engineer of the road, can no doubt furnish exact information on this point. We quote the following clear and brief history of this railroad from Mr. Poor's "History of Railroads and Canals," the first volume of which has just been issued:—

"The railroad first constructed in the State of New York, was the Mohawk and Hudson. It was chartered in 1826, and its construction commenced in 1830, and completed in 1831. It was one of the first in the United States on which locomotive power was used, two engines having been placed upon it soon after its opening. It was constructed with inclined planes worked by stationary engines near each terminus, with inclinations of one foot in eighteen. The incline near Albany was 3,102 feet long ; that near Schenectady, 2,046 feet. The rail used was a flat bar, 9-16ths by 2½ inches, laid upon longitudinal sills. The planes were removed in 1844, when the road was re-constructed. In 1847 its title was changed to the 'Albany and Schenectady,' and in 1853, it was consolidated into the New York Central. For the earlier years of its history it paid nothing to its stockholders, the greater portion of its earnings being used in the maintenance and re-construction of the road."

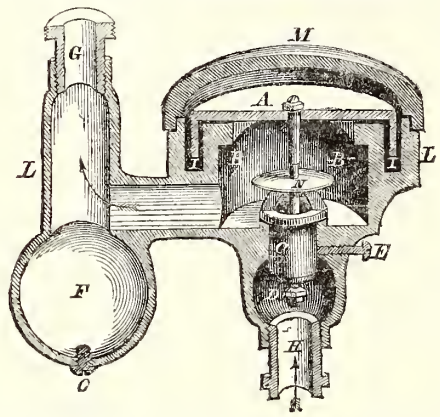
We can add something to the history of this road, which will be of interest to many readers. The first engineer of the road was Mr. Peter Fleming, who was sent by the company to England, for the purpose of examining the construction and working of the railroads in that country, prior to the commencement of the new enterprise in America, so as to begin with the very latest English practice. He surveyed the route, and it was under his directions that the road was constructed and the first locomotives from England ordered. It has been stated that he was tramelled for the want of funds to carry out his plans, and had there been a sufficient supply of money, a much superior road would have been built. For that day, however, it was held to be a very good sample of engineering. Mr. Fleming was the surveyor who laid out a great part of the upper section of New York city ; and he afterwards became Surveyor-general of Canada.

This railroad offers a very instructive commercial lesson. Its primary construction and the changes through which it has since passed prove that when it was a cheaply-built and ill-conditioned road, it never paid a single dividend to its stockholders, while, on the other hand, as soon as the inclines were removed, and a good solid track laid for the locomotives to run upon the whole distance, it began to be profitable.

IMPROVED GAS REGULATOR.

The annexed engraving appeared in Vol II. (new series) of this paper, but owing to a slight inaccuracy in the description and the extensive use into which the invention has come since first introduced to the public, we believe we shall serve many of our readers by again presenting the subject to their attention.

The engraving is a sectional view of the regulator, which operates as follows:—H is the receiving pipe, which is connected to the exit pipe at the top of the meter, and from which the gas flows upward through the valve seat, C, into the chamber, B, from which it is discharged, as indicated by the bent arrow through pipe, G, to burners. The size of the orifice at the



lower end of the tube, C, is regulated by means of a conical valve which fits into the corresponding seat in the lower end, and is connected by a rod to the gasometer or regulating cap, A. This cap is provided with a rim or flange which projects downward into the annular recess or groove, I, formed in the case to receive it. This groove is filled with mercury, to prevent the escape of gas around the edges of the cap, A. N is a hood attached to the cross bar upon the top of the tube, C, through which hood the rod, which connects the valve, D, to the cap, passes. This hood deflects the gas which rises through the tube, and prevents its rising with too much force against the gasometer or cap, A. It also effectually protects the meter; for, under *no circumstances*, can the mercury get into the meter or in any way injure it. The parts being thus arranged, it is obvious that the elevation and depression of the cap, A, and with it the valve, D, will be entirely controlled by the pressure of the gas in the chamber, B, from which, as we have said, it is permitted to flow freely to the burners, and this pressure can be regulated by placing a weight upon the cap, A ; thus making a greater or less pressure in the chamber, and, consequently, at the burners. The tube, C, is ground to its seat and secured in position by the set screw, E. It can be readily removed with the valve and cap, A, by withdrawing the set screw, and the working parts cleaned and replaced when necessary. M is a cover for protecting the working parts. A chamber, F, is attached at the angle in the exit pipe to catch any impurities in the gas, and the sediment thus retained may be removed by withdrawing the screw, O, at the bottom of the chamber.

We have three of these regulators in use, and they have proved highly satisfactory. Their superiority over instruments of a similar character which have come under our notice arises from the simplicity of their construction and the facility with which they may be kept in order. By removing the cover, M, and turning out the screw, E, the valve seat may be taken out, cleaned and replaced in a few minutes by the most unskilled. The usual saving of gas over street pressure is from 20 to 40 per cent. The following reports from the Superintendent of Lamps and Gas in this city are ordinary illustrations of the consumption of gas with and without the regulator:—

		1859		1860		
		Without Reg'r.		With Reg'r.		Decrease.
		Feet.		Feet.		Feet.
City Hall	150,000..	$376 50	8 9,900...	$223 75	60,700....	$151 75
Fulton Meat M't.	122,000..	305 00	8 6,500...	216 25	35,500....	88 75
Fulton Fish M'kt.	29,800..	74 50	2 7,200,..	68 00	2,600....	6 50

Saving.	Per cent.
City Hall	40½
Fulton Meat Market	29

"There has been no decrease in the number of burners in the above places, or in the number of hours burning ; the flickering and blowing of the lights, caused by the difference in pressure, entirely ceased, and a steady and uniform light was given ; and as the above saving is much more than the price of the regulators, I would respectfully recommend that those now in use be purchased, and that in the public buildings where a large quantity of gas is consumed, the regulators be placed therein."

The prices of the different sizes are as follows:—

For No.	2, adapted to	20	burners	$10 00
"	3, "	40	"	15 00
"	4, "	100	"	25 00
"	5, "	400	"	50 00

Further information (if anything remains to be said) can be obtained by addressing the Wheeler & Wilson Manufacturing Company, who are now making and warranting these machines. Office, No. 505 Broadway, New York.

TRIAL TRIP OF THE "FIRE DART."

In our issue of Nov. 10th we gave a full description of a new steamer, building by Thomas Colyer, for Messrs. Heard & Co., of Boston and China, destined for the China coast trade.

On Thursday, the 22d ult., we had the pleasure of an excursion in the new ship, which is the pioneer vessel of a new line of American steamers for the Chinese waters. Although we have been present at the trial trip of a great number of our ocean steamers, we have never witnessed such perfect action in a new piece of large mechanism as was evinced in the working of the engine on the first trip of the *Fire Dart*.

The remarkably steady movement of the vessel, as she darted through the waters at the speed of 20 miles an hour, which she made for a short distance, was commented upon by the guests on board—many of whom were nautical men—as most remarkable; and certainly we never experienced, on any craft, so little of that unpleasant jar which every one who has traveled on steamboats has felt, from the *Great Eastern* down to our river steamboats, as we did on the *Fire Dart*.

The *Fire Dart* is to sail for the coast of China *via* Cape of Good Hope, about the 1st of December, under the command of Captain Henry W. Johnson, who acquired considerable fame a few years ago, while commander of the merchant ship *Invincible*, for the quick passages he made with that vessel. We hope fair winds may waft safely this noble steamer and her commander to his distant port, and that the owners will reap a rich reward in this new department of their long and successful operations in China, which, we believe, extend back to more than half a century.

Our Position—A Word to Four Thousand Subscribers. — About four thousand subscriptions will expire in three weeks from this time. These are scattered throughout the northern, southern and western States. We feel, of course, a deep interest that these subscriptions should be renewed, and confidently hope our subscribers will do so. The character and aims of this journal are well understood, and we point to the past as a sure guarantee of what we shall endeavour to do hereafter. We shall labor to promote the industrial interests of all sections, and shall studiously avoid, as foreign to our purpose, all intermeddling with political agitations. We hope for a speedy settlement of every vexatious question, and for a return of that fraternal feeling which ought always to characterize members of the same great confederacy. This, it seems to us, is the best way of promoting the advancement of our commerce, manufactures and the mechanic arts.

The President Elect an Inventor and Patentee.—On another page we illustrate a patented improvement in the mode of buoying steamboats and sailing crafts over sand bars, the invention of Abraham Lincoln, President elect of the United States. We believe this is the first instance of an inventor receiving the highest honor which can be conferred by a republican people, and whatever exceptions a portion of the States may take to the people's choice for their Chief Magistrate, we think other of our inventors may take courage and not despair of yet becoming Presidents. We presume the thought of becoming a President never entered Mr. Lincoln's thoughts at the time he was contriving his invention and seeking a patent.

SUCCESS VERSUS FAILURE—AN INVENTOR'S OPINION OF THE SCIENTIFIC AMERICAN.

The following letter from a patentee whose claims appeared in our last, we commend to the perusal of all who are about to apply for Letters Patent:—

MESSRS. MUNN & Co.—Yours of the 15th inst. was duly received. I was quite astonished to hear the result of the application for my improved bell attachment, so soon. I thought you had scarcely time to get my case fully prepared, when you informed me that Letters Patent were ordered to issue. I am gratified to think my confidence in you was not misplaced. On a former occasion, I desired to obtain Letters Patent for an invention, when a lawyer offered his services for twenty dollars, which I accepted. My case was *lost*; hence the necessity of employing competent agents. I can cheerfully recommend *yourselves* as such. I also consider your paper, the SCIENTIFIC AMERICAN, an indispensable boon to all lovers of the arts and sciences, and to those who wish to keep pace with inventive ingenuity; in fact it contains instruction and amusement for the *million*, and is well worth five times the price.

A. TAYLOR.

Ogdensburgh, N. Y., Oct. 24, 1860.

IMPROVED CORN AND COB MILL.

MESSRS. EDITORS:—In your paper of Sept. 27, Mr. W. S. Lewis, of Louisiana, makes inquiry about a mill "to grind corn in the ear (shuck and all) for cow feed." If it is not too much like *ax grinding*, I would like to inform him and others interested that I have used just such a mill for nearly two years, and it is beginning to be extensively introduced in this State, not only for corn, but for cotton seed. By grinding a portion of cotton seed with the corn, cob and shuck, and sending the exhaust steam through the mixture to cook it, the cost of feeding stock can be reduced one-half, and the results to the animals in the promotion of health and vigor are highly favorable.

I have also to thank you for the promptness with which you have prosecuted my application for a patent on the above-named mill, and the success which has attended your efforts, as I have just received the gratifying intelligence that my patent is ordered to be issued.

Yours, respectfully, C. W. SHEDD.

Addison, Ala., Nov, 17, 1860.

WATER TROUGHS SHOULD BE KEPT CLEAN.—Pure water is a great luxury to the palate of a thirsty horse, and every man who is fortunate enough to be the owner of so noble an animal, should see that the wants of the same are properly provided for. Unfortunately, very few persons realise the importance of supplying domestic animals with pure water; yet they stand in need of it whenever thirsty, and as a matter of profit to ourselves and charity to them, we should see that their wants are well supplied. Pure water is very nutritious, and, as a nutritious agent, its value is impaired when of inferior quality, or when mixed with indigestible foreign substance, such as is often found in watering troughs located by the wayside. Some very interesting experiments have lately been made on horses belonging to the French army, in view of testing their endurance as regards the deprivation of water, and it was found that some of them lived twenty-five days on water alone. It is a singular fact that seventy-five per cent of the weight of a horse's body is composed of fluid.

THE WINANS STEAMSHIP.—Few people are aware of the amount of capital lying behind the "cigar-shaped steamer *Enterprise*,' started some time ago by Mr. Winans, of Baltimore. Mr. Winans holds property of the value of $12,000,000, the whole of which will be held in readiness (though of course not necessary) for the prosecution of his mania. His recent contract calls for a steamer 600 feet in length, proportioned to correspond, and finished so as to cross the Atlantic ocean in five days' running time. By the way, he is now prosecuting a suit in the United States Circuit Court, in this city, against John Danforth and others for infringing a patent. Mr. Winans claims the discovery, some 20 years ago, of a valuable improvement in the manufacture of steam engines, relating to the use of waste steam, and sues the defendants, who are manufacturers at Paterson, N. J., for infringement of his patent. Mr. Winans claims damages to the amount of $150,000.

RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements lately patented:—

ERASER, PAPER CUTTER AND PENCIL SHARPENER.

This is a neat little counting room implement which will be found convenient on every desk. There is a sharp edge for erasing, a convex surface for polishing the paper, a blade for sharpening a pencil, and a serrated groove for finishing the point of the lead; all fastened to the same handle. It was invented and patented by A. G. Shaver, of New Haven, Conn.

LUBRICATING COMPOUND.

This invention consists in a composition obtained by uniting an alkaline base, such as potassa or soda, with oleine and stearine (the proximate acid principles of animal and vegetable oils, fats and tallow) and with cerine (the acid principle of wax), thereby producing a lubricator which, while it will economize power and prevent wearing, will not become glutinous, but keep the journals and other parts to which it may be applied, cool and so as to be easily cleaned. Its cheapness and peculiar lubricating qualities render it of particular importance for railroads, but it can be used with advantage for all sorts of journals or other parts of machinery which are exposed to friction. The credit of this valuable invention is due to Dr. John B. McMunn, of Port Jervis, N. Y.

APPLE PARER.

The object of this invention is to obtain a machine that will pare fruit and vegetables of oblong form, and such as have depressions in their surface, for instance, those which contain eyes, as may be seen in potatoes. The ordinary apple parers will pare fruit of nearly spherical form, having a smooth surface, but will not pare, without a great waste, fruits or vegetables having an irregular surface and varying very materially in dimensions from a sphere—an objection which, it is believed, this invention fully overcomes. J. Clewell and W. Schatz, of Nazareth, Pa., are the inventors of this contrivance.

SEASONING TIMBER.—Nothing tends to improve the usefulness and durability of timber more than thorough and proper seasoning. The object of this treatment is to remove all free moisture and sap. For this purpose the trees should be sawed soon after they are felled; but if this is impracticable, the logs should be barked and laid upon scantlings above the ground, to let the air circulate under them, or else they should be rolled into the mill pond. Logs should not be exposed to the hot sun in drying, as they are liable to split; they ought, therefore, to be kept in the shade, or be covered with brushwood. As soon as planks, boards, or scantling are sawed, they are to be piled up in the shade and allowed free circulation of air between them. Care should be exercised not to dry timber too rapidly, as it is liable to crack by the rapid expansion of the moisture and the sudden contraction of the fibers. In piling timber, it should be laid in such a position, when green, that it will not wind or twist, as it is liable to keep the position it assumes when drying, after it is seasoned.

LECTURES ON BRAZIL.—One of the most interesting and instructive lectures we have attended this season was delivered a few evenings ago by the Rev. J. C. Fletcher, at the Historical Rooms, in this city. The audience was very large, and the listeners were so much gratified with the lecture that they unanimously voted, at the close of it, to invite Mr. Fletcher to give a course of five more, the first of which was delivered last Friday evening, Nov. 23d, at the Cooper Institute, and are to be continued as follows:—Monday, Nov. 26th; Wednesday, Nov. 28th, Monday, Dec. 3d; and Friday, Dec. 7th. Mr. Fletcher is a vivacious, instructive lecturer, and the information he imparts relative to the size of Brazil (which is larger than the United States), the intelligence and customs of the people, productiveness of the soil, its unparalleled climate, and the enterprise of the ruling emperor, Don Pedro II., who is a great patron of the mechanic arts, is new to most of our people. We believe any intelligent person will be instructed and benefited by attending these lectures.

THERE is silk enough in a single cocoon to reach six miles.

THE SUPPLY OF COTTON.

"The growth of our cotton trade is the greatest marvel of British industrial enterprise. A century ago the women of Lancashire were engaged as spinsters, producing cotton yarn by the aid of the distaff and spindle, without any mechanical agency whatever. At the present time no fewer than 33,000,000 spindles are employed in the production of cotton yarn, while the looms are of corresponding extent. From four to five millions of the population are supported by this one branch of industry, which absorbs a capital of not less than £150,000,000, and consumes the precious fibre at the rate of 40,000 bags a week. Four-fifths of the cotton consumed in this country, consisting of 800,000,000 lbs., is slave-grown, and comes from the United States of America; from other foreign places 120,000,000 lbs.; whilst, from the colonies and dependencies of Great Britain, we only receive eight per cent. of our consumption, or 80,000,000 lbs. We are therefore glad to find that the new settlement at Port Kennaird, founded by Mr. Consul Pritchard, in the Fiji Islands, is prospering, and the bush is being vigorously cleared to make way for cotton plantations, and that Colonel Smythe is to examine and report to Her Majesty's Government as to the expediency of the annexation of these islands to the British Crown; for we are persuaded that the cultivation of cotton by the free labor of the natives of Eastern and Central Africa, and of the aborigines of the islands of the South Pacific Ocean, will do more to suppress slavery than all the attempts hitherto made; as from them, instead of from a slave-holding country, we should draw our future supplies."

We copy the above article on the supply of cotton, from a recent English journal. It will be read with great interest at this time, by all as it reveals the fact of the determination of the English people to use every possible expedient to supply their manufacturers with cotton without depending upon the Southern States.

The whole amount consumed from these States reaches the enormous aggregate of 800,000,000 lbs., while 200,000,000 lbs. are obtained from all other sources—which will doubtless be increased every year. What we want now is the application of the soundest principles of political economy, which shall develope the great resources of our States and make the interests of each more generally to be considered the interest of all.

ANNEALING IRON ARTICLES.

Articles of iron and steel are sometimes annealed by piling them in an open fire, and raising them slowly to a red heat; they are then left to cool gradually. This method is injurious on account of a scale of oxyd which forms on the surface, thereby depriving the steel of a portion of its carbon, which confers the property of imparting a keen edge, so essential to cutting instruments. Articles of steal and iron ought to be annealed in close vessels, or in a trough or recess made of fire-brick, and covered up with ashes or clean sand: or if a small vessel be employed, the cover may be of the same material as the vessel. The oven or trough is heated by the flame of a furnace passing under and round it until the whole is at a red heat. It is then allowed to cool without letting in the air. Goods thus treated become softer than by the common method, and the surfaces have a metallic whiteness imparted by the carbonaceous matter of the ashes. Annealed goods lose their brittle character so that they can be bent without breaking.

TRYING TO MAKE DIAMONDS.—James Huss, a Prussian chemist formerly residing in New York, has been in Detroit lately, trying to make diamonds out of cornelians and agates. He was a singular customer, had no communication with any one, and only divulged his mysterious business when he was threatened with arrest as a counterfeiter. As soon as public attention was called to his operations, he disappeared. He had half a bushel or more of disintegrated agates, some of which were burned, and others showed the action of acids, which seemed to have eaten out the impurities and left the flint as clear and transparent as crystal, which was, doubtless, the nearest he had come to the perfection of the sparkling diamond.

SHELL-FISH ROPE MAKERS.—Mussel shell-fish fasten themselves to piers with a material resembling coarse silk, which resists the force of the most powerful waves. The French engineers at Cherbourg have availed themselves of this faculty of the mussel to bind their great breakwaters. These consist of loose masses of stone, and on them were planted several tuns of this shell-fish, that they might bind all firmly together with their strong cordage; in this they have succeeded

EXTRAORDINARY PROGRESS OF AMERICAN INVENTIONS IN EUROPE.

Joints for Railway Bars or Rails.—Patentee, George S. Avery, of Cross River, N. Y. This invention was illustrated and described on page 344, Vol. I. (new series), of the SCIENTIFIC AMERICAN. About a foot of the end of one rail is bent outside of the adjoining rail, the latter having its end cut off at an angle of about 45°, so as to prevent any openings between the ends of the rails and thus obviate the jar.

Producing Draft in Chimneys, and Ventilation.— Patentee, George Colhoun, of Philadelphia, Pa. This is an improved device for applying the principle of Venturi for increasing the draft of chimneys or creating a current for ventilation. It is a very neat and compact arrangement.

Digesters for Dissolving Quartzose Rocks.—Patentee, Timothy H. Lang, of New York City. This is the famous apparatus for dissolving quartz and making artificial stone about which so much has been said in our own columns and elsewhere.

Coiled Springs.—Patentee, Carlos French, of Seymour, Conn. The object of this invention is to preserve the proper compactness and elasticity in coiled springs while giving them sufficient strength to sustain great pressure. The spring is composed of two or more leaves placed one above the other and welded together at the ends.

Knitting Machines.—Patentees, Wm. H. McNary and James G. Wilson, of New York City. The principal object of this invention is to knit a stocking complete, with a properly shaped heel and toe, by the continuous operation of a knitting machine, without the usual stoppages to adjust the work.

Treatment of India-rubber or Gutta-percha.—Patentee, Rudolph F. H. Havemann, of New Brunswick, N. J. The gum is dissolved in one of the well known solvents, such as the bisulphuret of carbon, benzole or chloroform, and a stream of gaseous chlorine is passed into the solution. The solvent is now removed by evaporation at a low temperature, when the new product appears on the bottom of the vessel in a plate of greater or less thickness, which, after drying, becomes perfectly hard and white like ivory.

Apparatus for Generating Steam.—Patentee, John M. Carr, of New York City. This is considered an excellent invention, but its nature and operation cannot be fully explained without the aid of an engraving.

Machine for Molding and Pressing Bricks.—Patentee, John Crary, of Pensacola, Fla. This invention consists of a novel mode of pressing bricks, whereby a concave form or surface is given to one of their sides, for the reception of cement or mortar.

Compensating Coil for Timekeepers.—Patentee, Henry Bœhm James, of Trenton, N. J. Combined laminæ of brass and steel (or other metals which contract and expand differently with the same changes of temperature) are applied to that end of the hair spring which is ordinarily fixed, in such a manner that by their expansion and contraction they will cause the spring to be taken up through its curb pins as it expands with an increased temperature, and that it will be let out as it contracts with a reduction of the temperature. In the same way, the length of a pendulum rod may be regulated by applying the combined laminæ at its upper end, to take it up or let it out with the changes of temperature.

Egg Beating or Mixing Apparatus.— Patentee, Edwin P. Monroe, of New York City. This is one of those neat little instruments needed in almost every family, which are the most certain to be profitable to their inventors, and we learn that the inventor of this is making a fortune out of it. Two common wire frame beaters, one within the other, are made to revolve in opposite directions by means of a light gear wheel supported on a suitable frame, which is furnished with a convenient handle. The frame is supported in one hand by the handle, and the gear wheel turned by a crank with the other hand.

Railways. — Patentee, George W. R. Bayley, of Brashear, La. This invention relates to a peculiarly formed reversible rail, and the mode of securing and bracing it. An illustration of this invention will be found on page 21, Vol. II. (new series), of the SCIENTIFIC AMERICAN.

PANIC IN THE MONEY MARKET.

During the last week there has been a stringency in the money market not before experienced since the autumn of 1857. Stocks in Wall-street have fluctuated from day to day from three to five per cent; most of the Pennsylvania, Maryland and Virginia banks have suspended specie payments, and in portions of the country remote from this city, our correspondents write to us that it is almost impossible to buy drafts on New York, even at a premium of five to ten per cent. The prospects are that this derangement of financial matters will soon subside, and that drafts on New York can be bought a few weeks hence in almost any city or town in the country, at a small premium of from one and a half to two per cent, as usual. Such of our correspondents who find it impossible to procure drafts on New York in payment for subscriptions or patent business, are informed that we will receive the bills of any good bank in any part of the country at par, including the suspended banks of Pennsylvania, Maryland and Virginia. Of course, we very much prefer to receive drafts on New York, or bills on banks located in the vicinity of this city; and it is only to those who reside at remote distances that this offer to receive their currency at par is made.

At the time of our going to press, the discount charged on bills of banks located in the Western and Southern States range from 10 to 15 per cent. The bills on these banks we will receive at par for subscriptions and patent business, and such bills as we receive we calculate to hold until a change comes over the financial world, when such amount as we may have collected will be exchanged in Wall-street for gold or currency, at the usual small rate of discount.

VENTILATE THE CHURCH.—Under this caption we recently published some excellent observations on this subject, by Septimus Piesse. The importance of thorough ventilation was recently exemplified by unpleasant occurrences at the Universalist church in Woonsocket, R. I. For some reason, the furnace in the basement did not draw well, and gas was diffused through the vestry during the session of Sunday school, although its presence was hardly noticed by those who were in attendance. But when the children were dismissed and reached the open air, their strength failed, and many of them tumbled to the ground too weak to stand, while some were seized with vomiting and other violent symptoms of sickness. In the afternoon, after the congregation had assembled in the upper part of the house, and the preacher had commenced his discourse, one after another of the audience fainted, until the excitement became too great, and the exercises were summarily closed After the people had reached home, some were taken severely sick and remained in that condition until late in the evening. The next morning, however, all or nearly all had recovered their usual health. The only reason assigned for the sickness is impure air. Two or three nights ago, we retired to rest, feeling unusually well. We awoke with a severe dullness about the head, which lasted all day, and upon examining into the cause, we found that we had neglected to provide the usual ventilation for the chamber. This matter is one of the first importance to every one.

ANECDOTES of the Steam Engine, which we promised to commence the publication of in this number, are crowded out by pressure of other matter.

NEW BOOKS AND PERIODICALS RECEIVED.

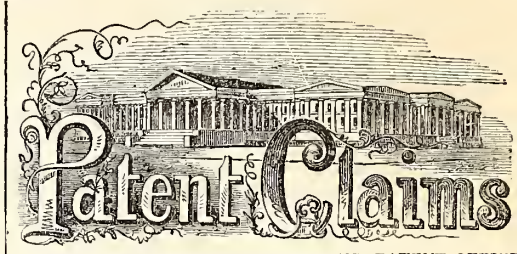
IZAAK WALTON'S LIVES—the Lives of Dr. John Donne, Sir Henry Wotton, Richard Hooker, George Herbert and Dr. Robert Sanderson; by Izaak Walton, with some account of the author and his writings. By Thomas Zouch, D. D. New edition, with illustrated notes—complete in one volume; 12mo, pp. 386. Boston: Crosby, Nichols, Lee & Co.

The name of Izaak Walton is familiar to all lovers of the gentle art who still regard the instructions contained in his "Complete Angler" as authority. Izaak possessed a mind also enriched with study and contemplation, as the book before us abundantly testifies. The opening memoir of old Izaak himself is in admirable harmony with the body of the volume. The book is pervaded throughout with a fresh geniality, and a pure, serene, unworldly feeling, oddly enough in contrast with the artificial intensity of modern sensation literature. The work is gotten up in the English style, with clear type and tinted paper, and reflects great credit upon its enterprizing publishers.

APPLETON'S RAILWAY AND STEAM NAVIGATION GUIDE; by D. Appleton & Co., Broadway, this city.

Our Texas correspondent informs us that he found this guide perfectly correct, in relation to distances, fares and times, on all the roads that he traversed from this city to the middle of Texas. It is a useful publication.

NORTON'S PROJECTILES.—We have received from the author, Captain Norton, a volume of 160 pages, which contains a list of his military and naval inventions. It is printed in England, and cannot be had at our bookstores here. Captain Norton is a well-known English inventor, and, we believe, holds an honorable position among his peers.



ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING NOVEMBER 20, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

30,661.—Russell Arnold, of Hartford, Conn., for an Improved Machine for Molding Parched Corn Balls:

I claim the arrangement of the frames, A and B, together with the cups, E and F, the pins, G and H, the spiral spring, h', the crank shaft, C, and the connecting rod, C', to be used for the purpose specified, substantially as described.

30,662.—T. B. Atterbury and J. S. Atterbury, of Pittsburg, Pa., for an Improvement in Covers for Fruit Jars:

I claim the arrangement and combination of the preserve jar, H, metallic ring, B, constructed with a shoulder, a, lug, b, slot, c, and screw, A, rubber ring gasket, G, clamp nut, G, and cover, E, constructed with a curved lip, F, and shoulder, d, all in the manner and for the purposes described.

30,663.—Archille Berthoud, of New York City, for an Improvement in Electroplating with Alloys of Gold:

I claim, first, The employment of the solution of copper prepared substantially in the manner as above set forth.

Second, The employment of solutions of gold and silver prepared substantially as above set forth, in admixture with the described solutions of copper.

Third, The above described process of electroplating metal with alloys of gold, so as to produce any desired color.

30,644.—L. D. Brown, of St. Louis, Mo., for an Improvement in Harvesters:

I claim the arrangement of the adjustable guide loop, f, and diagonally hinged bar, I, with the pole, F, frame, A, platform, B, slotted guide bar, E, lever, G, and bar, H, as and for the purposes shown and described.

[The object of this invention is to simplify and render as compact as possible the operating parts of grain and grass harvesters, and at the same time place the parts to be actuated manually not only within convenient reach of the driver, but also so arranged that they can be manipulated by him with the greatest facility.]

30,665.—G. L. Buckley, of West Barnstable, Mass,, for an Improved Settee or Chair:

I claim the combination of the hinged back, F, with the hinged and pivoted legs, operating as set forth for the purpose specified.

30,666.—John Chappel, of Green, N. Y., for an Improvement in Horse Rakes:

I claim the arrangement and combination of the prongs, g' g', the rollers, f f, levers, G G, crank handle, F, and spring catch, I, in the manner described for the purposes set forth.

30,667.—J, L. Clewell, Jr., and Wm. F. Schatz, of Nazareth, Pa., for an Improved Apple and Potato Parer:

We claim, first, The combination of the rotary fork, G, with the traveling and rotary cutter, Z, arranged substantially as and for the purposes set forth.

Second, In connection with the traveling and rotary cutter, Z, and rotary fork, G, the sliding or adjustable wheel, E, operated through the medium of the levers H J, and shaft, I, for the purpose of stopping the rotation of the article, D', when necessary to allow the cutter to pass into depressions or sunken places in the surface of said articles.

Third, The combination of the two frustrums of cones, N O, with the adjustable elastic ring or band, Q, arranged substantially as shown, to vary the speed of the traveling movement of the cutter, Z, as circumstances may require.

30,668.—S. W. Collins, of Canton, Conn., for an Improvement in the Manufacture of Edge Tools:

I claim, first, The casting of axes and other tools and implements partly of iron and partly of steel, or of different qualities of steel, by pouring in a melted state, first one of these metals and then the other, thus superseding the necessity of welding or otherwise attaching the different metals together in the way heretofore practised, all of which is done in the manner and for the purpose set forth.

Second, The casting of edge tools from steel or from steel and iron combined by leaving the steel edges thick in the first instance and afterwards drawing them down under a hammer, in the manner described.

30,669.—Isaac Cressman, of Philadelphia, Pa., for an Improvement in Gas Stoves:

I claim the combination with gas stoves, ovens or heaters having double walls or plates, at two opposite sides and top and bottom thereof, so as to constitute a continuous jacket or hot air chamber, in which the products of the combustion of gas may be allowed to circulate at pleasure of a burner or burners surmounted with inverted truncated cone-shaped cups having air openings in the bottom and a flange on the top, so that the said cups may be supported in corresponding holes in the bottom plate of the oven, in such a manner as that it or they shall be flush or nearly so with said bottom plate, and that an unobstructed circulating medium for the heated gases may be obtained.

30,670.—J. C. Dickey, of Saratoga Springs, N. Y., for an Improved Gold Washer and Amalgamator:

I claim, first, The bearing, k, for the purpose specified.

Second, The arrangement and use of the adjustable plates, c and d, for the purposes set forth.

30,671.—O. C. Dodge, of Brooklyn, N. Y., for an Improved Adjustable Table:

I claim the racks, d d, in the standards, b b, combined with the pawls, g g, and rope or cord, h, in the manner and for the purposes specified.

In combination with said racks, d d, and pawls, g g, I claim the sector, l, and clamp, k, for regulating the inclination of the table, as set forth.

I also claim the table, m, on the bracket, l, connected by the eyes 3 3, the rack, d, in the manner and for the purposes specified.

30,672.—David Eldridge, of Philadelphia, Pa., for an Improved Method of Hanging Circular Saws:

I claim so arranging the driving and driven pulleys, O and T, as to transfer the strain caused by the resistance while sawing from the saw arbor to the arbor of the driving pulley for purposes set forth.

30,673.—David Eynor, of Philadelphia, Pa., for an Improvement in Making Railroad Chairs:

I claim, in combination with the horizontal and vertical bars that are to compose the pile, the central plug, core, or brace of wood, and the external tie of wire, so that the pile may be inverted and charged and heated in this inverted position in the furnace, substantially as described.

30,674.—DeWitt C. Farrington, of Lowell, Mass., for an Improvement in Cooking Stoves:

I claim dividing the oven space by such a form of bent flue communicating with the fire chamber, as to form thereby two separate ovens, each containing a deep and shallow portion or compartment, substantially as described.

30,675.—H. B. Goodyear, of New Haven, Conn., for an Improvement in Vulcanizing India-rubber Tips for Shoes:

I claim, first, The employment of a cast iron tip mold or former, made hollow or otherwise equivalently constructed, to establish a pinned connection of it with the tray or platform which serves to carry the molds and tips, substantially as specified.

Second, Providing the tip mold or former with a hook or pin, on to which the tip may be hitched, and which serves to keep the tip to its place on the mold, essentially as set forth.

Third, In the vulcanizing of india-rubber shoe tips or other like articles the process described of holding the tips to their places and the molds in their position, substantially as specified.

30,676.—J. J. Gwynn, of Plainfield, N. J., for an Improvement in Valve Gear of Steam Engines:

I claim, first, The friction cam plate, in combination with the slotted arm and movable wrist pin, substantially as described.

Second, I claim, in combination with the governor of a steam engine the movable wrist pin, slotted arm, friction cam plate, ratchet and pall, substantially as described and substantially for the purposes set forth.

30,677.—H. R. Hawkins, of Akron, Ohio, for an Improvement in Hay and Straw Cutters:

I claim the use of the hook bolts, H H′, in connection with the right angled shaft for making the knife adjustable.

30,678.—B. Holly, of Lockport, N. Y., for an Improvement in Hose Coupling:

I claim a nut constructed with gears or teeth, a, and fulcra, c, surrounding its hub or center, substantially in the manner and for the purposes shown and described.

30,679.—C. B. Hutchings, of Rochester, N. Y., for an Improvement in Grain Separators:

I claim the arrangement of the tubes, T′ T″, and sieves, S, with the spouts, E n m, chamber, I, and fan, F, all constructed and operating substantially as and for the purpose set forth.

30,680.—J. B. Hyde, of Newark, N. J., for Compositions for Supports in Blowpipe Operations:

I claim the described alchemist plates as an article of manufacture, made in the manner and for the purpose set forth.

30,681.—James Johnson, of Garysburg, N. C., for an Improvement in Metallic Hubs of Carriage Wheels:

I claim the combination and arrangement of the hub, A, cap, D, and the screw shaft on the shoulder of the spoke, whereby the spoke is securely held in its position.

I also claim the combination and arrangement of the screw nut, k, on the arm of the axle, with the pivot, N, in the cap, D, as described, for the purpose of preventing the oscillation of the hub on the arm of the axle.

30,682.—S. P. Kase, of Danville, Pa., for an Improvement in Machines for Cleaning Rice:

I claim, first, The circulation of a stream of cold water around the pot or vessel in which the rice is contained while being cleaned, substantially in the manner and for the purpose described.

Second, The bell-mouthed hub, C, when arranged to operate in relation to the bottom of the pot substantially as set forth.

Third, The grooves, c′, in the bottom of the hub, C, when arranged and operating as described, for the purpose set forth.

Fourth, The combination of a stream of water flowing around the pot with a stream of air passing through the grain, substantially as and for the purpose set forth.

Fifth, The combination of the elevator, E, hopper boy, g, and cooling tub, F, when arranged for joint operation substantially as set forth.

Sixth, The combination of the scoops, d, with the flange, 6, as described.

30,683.—J. C. Loveland, of Springfield, Vt., for an Improvement in Spring Hooks for Clothing:

I claim the spring hook for clothing formed as specified, with the springing point, 4, for the purposes and as set forth.

30,784.—J. W. Moffitt, of Harrisburgh, Pa., for an Improvement in Artificial Teeth:

I claim, as an improved article of manufacture, the artificial teeth and gums made as described.

30,685.—Hiram Moore, of Brandon, Wis., for an Improvement in Seed Drills:

I claim, first, The conduit or passage, H, arranged between the bottom of the hopper and the discharge, in combination with the oblique discharge, l, and the toothed distributing cylinder, C, substantially as described and for the purposes specified.

Second, I claim the combination of the separate bearings of the cylinder with a single shaft bearing in the cylinder, shorter than the cylinder and larger than the shaft, in the manner and for the purposes substantially as specified.

Third, I claim a distributing cylinder for seeding machines, having a beveled bearing, substantially in the manner and for the purposes specified.

30,686.—H. A. Nevers and Charles Ross, of Claremont, N. H., for an Improvement in Churns:

We claim the combined arrangement of the driving shaft, F, face plate and crank pin, H C, with the vertically reciprocating carriage, I, provided with a horizontal slot, d, and the rod, J, of the dasher, the whole being constructed and operating as specified, for the purpose set forth.

30,687.—John North, of Middletown, Conn., for an Improved Mousing Hook:

I claim an improved mousing hook, when arranged substantially as and for the purpose described, forming a new and improved article of manufacture.

30,688.—C. G. Page, of Washington, D. C., for an Improvement in Aural Instruments:

I claim the deflector, A B E, to be applied to the ear, substantially as described, said deflector consisting of a simple reflecting surface applicable to the ear, and conveying vibrations to the external meatus directly, without the aid of a pipe or tube, and being constructed without reverberating cavities, and also so constructed as to intercept all aerial vibrations except those coming in one direction, viz.: those which enter the open space at its expanded portion, all substantially in the manner and for the purposes set forth.

I also claim the combination of the deflecting instrument with hats, caps or bonnets, in the manner set forth.

30,689.—C. H. Perkins, of Providence, R. I., for an Improved Machine for Punching Horse Shoes:

I claim, first, The combination of a punching lever with a series of jointed punches, each of which can be adjusted independently of the others, so that a series of holes can be punched in different directions of obliquity to the plane of the surface of the shoe or other object to be acted upon, substantially as described.

Second, I also claim the adjustable pronged holder (Fig. 6), for the purpose of securing the object to be punched firmly to the table, and thereby preventing the breaking of the punches as they are withdrawn.

30,690.—S. Pettibone and O. Pettibone, of Corunna, Mich., for an Improvement in Grain Separators:

We claim hanging the shoe of a grain separator, when connected with the fan case as shown and described, by means of the pins, e g, arranged substantially as and for the purpose set forth.

[This invention consists in a novel way of hanging the shoe, so that the shoe may be adjusted longitudinally in a vertical direction, thus giving the screens a greater or less inclination, as circumstances may require; the mode of hanging the shoe also admitting of its adjustment transversely, so as to insure a horizontality in its transverse section, and, consequently, a perfect operation of the machine.]

30,691.—F. F. Smith, of Momence, Ill., for an Improvement in Making Plow Plates of Molten Steel:

I claim making plow plates of irregular forms and of variable thicknesses by pouring molten steel into iron molds, in the manner and for the purpose set forth.

30,692.—M. E. Rudasill, of Shelby, N. C., for an Improvement in Hatchets:

I claim the employment of the rotating spring claw, C, in combination with the hatchet, A, the same being used substantially as and for the purpose specified.

30,693.—John Ruegg, of St. Louis, Mo., for an Improved Brush Making Machine:

I claim, first, The use of the nozzle, constructed substantially as described, in combination with the needle, for the double purpose of opening the loop and feeding the bristles through.

Second, I claim the combination of the spring clamp, H, with the head, u, whereby the brush block is held up against the said head while the needle operates through it.

Third, I claim the combination of the pincers with the needle bar, substantially in the manner described, for the purpose specified.

Fourth, I claim opening and closing the pincers by means of a cam lever, T, and spring, C, as set forth.

Fifth, I claim the combination of the levers, S and R, with the needle bar and the pincers, whereby those two devices are made to operate as described.

Sixth, I claim the combined use of the hopper or feeder box and the claw wheels, M, and also the combined use of the gage, T, with the said claw wheels, and the use of the claw wheels in combination with each other, all for the purpose specified.

Seventh, I claim the lever, R, in connection with the claw wheels and the needle bar, whereby the bristles are divided into tufts and the tufts put into the brush back simultaneously.

30,694.—W. A. Sands, of Brooklyn, N. Y., for an Improvement in Ships' Sails:

I claim the arrangement of the ropes, a, with the edges, c c, of the sail, in the manner shown and described, when the said edges are attached to said ropes by stitching so as to avoid lapping or banding, all as set forth.

[This invention consists in making sails for vessels with corded or roped seams, thereby not only giving them greater strength with less weight than when made with lapped seams in the usual manner, but affording greater facility for handling them aloft.]

30,695.—Jacob Schuffelin, Jr., of Tioga, Pa., for an Improvement in Straw Cutters:

I claim the arrangement of the rack bar, L, with the pinions, I P, the latter having ratchets, n, attached into which pawl, o, of shaft, M′, engages feed roller, P, reciprocating bottom, O, and lever, K, attached to yoke, G, of shaft, H, as and for the purpose set forth.

[This invention relates to an improvement in the cutting apparatus, and also to an improvement in the feeding device. The object of the invention is to obtain an easy drawing cut, and one which will have a tendency to keep the knife in proper working order. The invention also has for its object the feeding of the substance to be cut with a positive movement, or with such a device as will insure its proper movement towards the knife at each vibration of the same.]

30,696.—A. G. Shaver, of New Haven, Conn., for an Improvement in Scalpels:

I claim the double concavo-convex or spoon-formed cutting instrument, constructed in the manner and for the purposes described.

30,697.—A. R. Reese, of Phillipsburg, N. J., for an Improvement in Fodder Cutters:

I claim the combination of the feed rollers, G and H, the endless chains, F and O, arranged as described, for the purpose of varying the speed of the rollers, and for the purpose of causing the two rollers to revolve at different rates of speed, substantially as set forth.

30,698.—R. S. Stubbs, of Claremont, N. H., for an Improvement in Attaching and Detaching Ships' Boats:

I claim, first, The employment of a capstan barrel, to which the endless rope or chain, E, is applied, to take up the slack in raising a boat, and which barrel is operated on by a worm pinion, H, and wheel, H′, between which and the capstan the pawl, 7, and wheel, 6, are fitted, the whole acting in connection with the brake, F, to raise or lower the boat, as specified.

Second, I claim the latches, 4, in the inverted position shown, to take the bolt heads, M M, in the manner specified, when combined with the lever, 3, and rod, L, for disconnecting said latches, and with the lowering apparatus, for the purposes and as set forth.

30,699.—H. N. Willbur, of Keokuk, Iowa, for an Improvement in Soap Composition:

I claim the mixture composed of the materials in the proportions and manner and for the purposes set forth.

30,700.—Stephen Wilcox, Jr., of Westerly R. I., for an Improvement in Air Engines.

I claim, first, The combination and arrangement of the two single acting working cylinders and pistons with the two changing cylinders and pistons, so as to operate together substantially as described for the purposes set forth.

Second, The combination and arrangement of the eccentric, H, short connection, h, idle lever, I, link, g, and the changing piston or pistons, b, together with suitable means for communicating the motion to the latter, for the purpose of giving the proper periods of rest and motion to the changing pistons, b, substantially as specified

30,701.—Stephen Wilcox, Jr., of Westerly, R. I., for an Improvement in Air Engines:

I claim, first, In combination, an air engine, in which the air and gases are heated by combustion within the cylinder, or in a chamber leading thereto, the use of a regenerator, F, substantially as and for the purposes described.

Second, Gradually supplying the combustible gas or vapor for a gas engine, operating substantially as described, as it is consumed, and in the proper quantity for each stroke, by means of the pump, G, or its equivalent, for the purpose set forth.

Third, Combining a quantity of cooler air with the products of combustion, by the combined action of piston, b, and valve, M, or their equivalents, substantially as described, for the purpose of preserving a safe degree of heat within the cylinder, as set forth.

Fourth, The supplemental valve, m, arranged and operating substantially as and for the purpose specified.

Fifth, The arrangement of the evaporator, N, reservoir, O, and heater, P, substantially as described and for the purpose set forth.

Sixth, Placing a piece of fire brick, L, or equivalent substance, in close proximity to the burner, j k, for the purpose specified.

30,702.—S. H. Witmer, of Cincinnati, Ohio, for an Improvement in Securing Railroad Rails to the Cross Ties:

I claim the combination of the deep vertical gain, 1, gib, E e, shoe, D d, and beveled sides, 2, the whole being constructed and operating in the manner and for the purposes set forth.

30,703.—M. L. Collender (assignor to himself, the Warren Chemical and Manufacturing Company and Elbert Perce), of New York City, for an Improvement in Hydro-carbon Burners:

I claim the employment of the auxiliary jets and cap or heater, D, in combination with the air mingling chamber, C, substantially as and for the purposes shown and described.

30,704.—Wm. Crotzer (assignor to himself and Samuel Beamer), of Spruce Creek, Pa., for an Improvement in Grain Cleaning Machines:

I claim, first, The arrangement of the hopper, S, shoe, Q, boxes, O N, and fan box, C, as shown, the hopper, shoe and box, O, being provided respectively with the screens, T R P, as described, all constructed and operating as and for the purpose set forth.

Second, The scouring device, formed of the cylinder, J, perforated as shown, and having the projections and knobs, j k, at its inner side, and the rotating disks, J R, provided with the beaters, L, and the fan, H, on the shaft, B, in combination with the boxes, N O, shoe, Q, and the spout, F, the latter communicating with the fan boxes, C G, and all arranged for joint operation, as and for the purposes set forth.

[This invention relates to grain cleaning machines of that class which are designed to separate smut and other impurities from the grain, and consists in a novel construction and arrangement of screens, fans, blast spout and a scouring device, whereby the desired work is thoroughly performed.]

30,705.—A. Seamans (assignor to Marion Seamans), of Bowmansville, N. Y., for an Improvement in Washing Machines:

I claim the combination and arrangement of the several rubbing and pounding blocks, H H, attached to the spring slats or arms, G G, and acting simultaneously, but separately—the concentric bottom, D, having its upper portion corrugated and its lower portion plain or smooth, and the butting "board or back," m, substantially as and for the purpose specified.

30,706.—V. Van Vleck (assignor to himself and Ralph Lockwood), of New York City, for an Improvement in Dental Chairs:

I claim, first, The arrangement of the longitudinally sliding bolt, G, in combination with the seat, A, and the hemispheres, B and F, constructed and operating substantially in the manner and for the purpose set forth.

Second, The arrangement of the toggle arms, H, and slotted treadle, I, in combination with the bolt, G, seat, A, and hemispheres, B and F, constructed and operating substantially as and for the purpose specified.

[This invention consists in the arrangement of a longitudinally sliding bolt, in combination with the seat of a chair and with two hemispheres, one working inside the other, in such a manner that, by depressing said bolt, the seat of the chair may be retained in any desired position, whether horizontal or inclined. It also consists in the combination with said longitudinally sliding bolt and with the two hemispheres, of two toggle arms acting on the head of the bolt, and acted upon by a handle in such a manner that, by depressing the treadle, the two hemispheres are locked and the seat retained in its position.]

30,707.—A. M. White, of Hartford, Conn., assignor to Rogers & Brother, of Waterbury, Conn., and the Hartford Manufacturing Company, of Hartford, Conn., for an Improvement in Burnishing Machines:

I claim the revolving burnisher head, a, substantially as described, whereby I am enabled to present the surface to be burnished to the ends of a series of burnishers, arranged substantially as and for the purpose described.

Second, I claim the arrangement of the sliding stock, d, holder, c, cam or pattern, f, in combination with the head, a, substantially as and for the purpose described.

RE-ISSUES.

H. H. Herrick, of East Boston, Mass., assignor through mesne assignments to C. J. F. Eastman, of Boston, Mass., for an Improved Carpet Sweeper. Patented Aug. 17, 1858:

I claim, first, Inclining or grooving the brush shaft as at o and k, as described, for the purposes specified, in combination with the cylinder brush for sweeping as before described.

Second, I claim protecting the bearings from dust by means of the plates, l m and n, operating in the manner described, for the purpose specified.

Third, I claim two receptacles for receiving dust, the trough, I, and the principal dust pan, with the projecting lip, all arranged as and for the purpose specified, in combination with the cylindrical dust brush.

Fourth, I claim dividing the brush in the center and connecting each half with one of the driving wheels, as set forth, in combination with the method herein described of pivoting the inner ends to a suspended support, as described, whereby the continuity of the brush is not interrupted, as set forth.

J. B. McMunn, of Port Jervis, N. J., for a Lubricating Compound. Patented Jan. 3, 1860:

I claim the compound made of the herein named ingredients, by combining them together substantially in the manner and in about the proportions herein set forth.

Horace Trumbull, of Jersey City, N. J., for an Improvement in the Manufacture of Flint Glass. Patented July 3, 1860:

I claim the substitution of the oxyd of zinc for the oxyd of lead in the composition of ordinary flint glass, substantially in the manner and for the purpose fully set forth.

Stephen Wilcox, Jr., of Westerly, R. I., for an Improvement in Air Engines. Patented May 3, 1859:

I claim, first, The arrangement of the passages, c e, relatively to the working cylinder, A, regenerator chamber, E, and changing cylinder, B, so as to connect them at their hot ends, substantially as and for the purpose specified.

Second, The within-described arrangement of the working cylinder, A, changing cylinder, B, regenerator, F, and the valve or valves by which the piston, h, is made both to change the air from the cold to the hot end of the cylinder and to receive a fresh volume of air for the next stroke, with the advantages set forth.

Third, Automatically regulating the temperature of the interior of the heating surfaces by the employment of the parts, H and I, arranged relatively to the heating surfaces of the cylinders, A and B, and to the damper, n, or its equivalent, substantially as described.

Fourth, Giving the regenerator an increasing area from the cold to the hot side, substantially as and for the purpose set forth.

Fifth, Working the single valve, M, in combination with the two pistons, a and b, as described, so as to thereby accomplish the threefold purpose of induction, eduction, and equilibrium valve, substantially in the manner and with the advantages set forth.

Stephen Wilcox, Jr., of Westerly, R. I., for an Improvement in Air Engines. Patented May 3, 1859:

I claim in air engines in which changing and working cylinders are combined substantially as shown, employing as heating surface a portion of both the changing and working cylinder, substantially as and for the purposes set forth.

Charles Goodycar, of New Haven, Conn., executor of Charles Goodycar, deceased, formerly of said New Haven, for an Improvement in the Manufacture of Caoutchouc. Patented June 15, 1844. Re-issued December 25, 1849. Extended for 7 years from June 15, 1858, and again re-issued November 20, 1860:

I claim the new manufacture called "vulcanized india-rubber," which is a combination of India-rubber with sulphur (whether with or without other ingredients), chemically altered by the application of heat, substantially as described.

Charles Goodyear, of New Haven, Conn., executor of Charles Goodyear, deceased, formerly of said New Haven, for an Improvement in the Art of Preparing Caoutchouc. Patented June 15, 1844. Re-issued December 25, 1849. Extended for 7 years from June 15, 1858, and again re-issued November 20, 1860:

I claim subjecting caoutchouc or india-rubber, or other vulcanizable gums, mixed with or in the presence of sulphur (whether with or without other ingredients) to the action of heat, for the purpose of affecting its qualities or properties as described.

ADDITIONAL IMPROVMENT.

Amos Glover, of Powhattan Point, Ohio, for an Improvement in Corn Crushers. Patented June 5, 1860:

I claim the revolving arms or claws, n and h, operating and driven substantially as and for the purpose set forth.

Notes and Queries

T. G. A., of Ill.—The action of the steam on the governor of an engine must, doubtless, take some very minute portion of time, owing to the imperfection of the machinery.

G. E. S., of Pa.—We know of no better work on magnetism, the formation of coils, &c., than that by Davis, of Boston, called, we believe, "Davis's Manual of Magnetism."

C., of Mass.—We can give you no information in regard to the raining down of snakes and silkworms. The planet Neptune is never visible to the naked eye, and Herschell seldom. One or two of Jupiter's satellites have been seen without the aid of a telescope, but this cannot be said of the asteroids.

G. W. S., of Tenn.—You will find the process of obtaining aluminum described on page 345, Vol. II. (new series) of the SCIENTIFIC AMERICAN. We presume George P. Reed, of Roxbury, Mass., would make you a watch with an aluminum case. If you will write to the brothers Chester, of this city, they will inform you of the price of a magneto-electric machine such as you want. We do not know that the work of Septimus Piesse, on magic, is to be found in this market.

H. A. T., of Pa.—The base of quartz is silicon, which is not a metal. Aluminum is a metal resembling silver, and its ore is clay. You will find a description of improved processes of obtaining it, on page 345, Vol. II. (new series) of the SCIENTIFIC AMERICAN.

P. G. R., of Minn.—Steel is tempered by heating it red hot and plunging it into cold water, and then gradually reheating it till it becomes as soft as desired.

J. B. A., of Nova Scotia.—In the magneto-electric machine described, there is an apparatus for changing the poles. A succession of shocks is produced, but so close together that the current is nearly constant.

O. O. W., of N. H.—The mineral which you send us is the bisulphuret of iron (iron pyrites). It is valueless.

D. S., of Pa.—Perhaps some of the statements in your letter will be interesting if published in connection with the illustration of which you speak.

O. A. T., of N. Y.—You can learn the cost of magneto-electric engines by addressing H. N. Baker, at Binghampton, N. Y.

G. L. K., of Pa.—If you had taken a look at your drawing after you had finished it, you would have seen that there are four balls on the rising side of the wheel and only three on the descending side. You have failed of perpetual motion this time.

A. C., of Cal.—A quantity of clean lumps of freshly-burned charcoal put into your cistern, will probably keep the water sweet. We should arrange a cistern so as to have the first part of a shower—which washes the dirt off a roof—run outside the cistern. This could easily be done by leading the pipe from the roof into a hogshead, and fitting a float to shift the pipe when the hogshead became filled, so as to run the water into the cistern. Pure water will never spoil.

E. M., of Mass.—You can neutralize the effects of the soda in your rosin stiffening composition by adding an acid, but at the same time you will destroy its adhesive quality. Lac varnish is superior to rosin varnish for stiffening felt hat bodies, but it is more expensive.

L. A. C. P., of Va.—The specimens of mineral which you have sent us appear to be impure plumbago. Their true value cannot be ascertained without considerable expense for analysis, and a greater quantity would be required for conducting the operations.

G. F. De V., of S. C.—You cannot obtain the soluble glass in powder, in this city, but you can manufacture it. Fuse white sand and potash together in a crucible; then throw the contents into cold water, and you will have a brittle glass which, if ground to powder, is soluble in boiling water. You can render rosin partially uninflammable by dissolving it in a strong solution of soda or pearl ash, but it would perhaps render it useless for your purpose. We are not acquainted with the roofing and painting materials to which you refer.

S. T. M., of C. E.—The ore which M. H. B. left with us, at your request, and which was found on the line of the Grand Trunk Railway, is principally galena or sulphuret of lead. We think it also contains considerable silver, and we advise you to have a quantitative analysis made of it, to determine its full value. If the ore is abundant, it may be a profitable mine to work.

T. E. K., of Ga.—You can make good composition hearths with a cement composed of dry lime, fine gravel and sand, in equal parts, made into a proper consistency with red lead paint. When it dries, it will be very hard and will not be injured by water. A hard cement for floors may also be made with lime, dry sand, and fine gravel, rendered plastic with water containing some glue in solution, but it will not stand exposure to moisture.

E. D. D., of N. C.—Spring catches have been applied to hinged tail boards of carts and wagons, to prevent rattling, but we have not seen any arranged like yours. We doubt, however, whether such a device could be patented; we are of opinion that it would be rejected on account of a lack of novelty. We think however, the device might be applied with advantage in all cases as the expense would be very trifling.

J. J., of N. Y.—We have observed the discrepancy of which you speak, among the authorities in regard to the specific gravity of air, and attribute it to the different temperatures at which it was examined by different observers. The quantity of aqueous vapor which it holds also affects its specific gravity. Cooke, the latest of the high authorities, and probably as reliable as any, says that a litre of air at a temperature of 32° Fah., with the barometer at 76 centimetres (29.92 inches), weighs 1.294 grammes. As a litre of water at 32° weighs 1,000 grammes, this makes water 773 times heavier than air.

D. C., of Mass.—About four pounds of caustic potash and a like quantity of pearlash, dissolved and added to 700 gallons of spirits in a still, will remove the essential oil in the course of distillation. By agitating alcohol that has a bad odor, with charcoal, it will be freed from all unpleasant smell. About four ounces of charcoal will deodorize one pound of alcohol in twenty four hours. By filtering alcohol through air-slacked lime, it will also be deprived of all offensive odor.

C. C. F., of Mass.—The finest qualities of salt are made by evaporating saline brine, and not by grinding rock salt. The latter generally contains many impurities, which have to be removed by dissolving it and precipitating the foreign mixtures with gelatine, clay and fresh lime. Many impurities also come over in the skimming. Excellent salt is now made at the Onondaga salt springs, in this State. Salt intended to be put up in bags is dried in warm rooms before being packed.

S. S. B., of R. I.—It was at one time taught in crude works on natural philosophy, that at a certain depth, the waters of the ocean were so dense (owing to superincumbent pressure) that stones and even pieces of metal thrown in at the surface could not reach the bottom. Such ideas are erroneous, because water is almost incompressible. We have discussed this question in former volumes of this journal. A sounding line has been sunk to the depth of seven miles, and the bottom reached. You will find an illustrated article on deep sea soundings on page 256, Vol. IX, (old series) of the SCIENTIFIC AMERICAN.

E. H., of Pa.—A very great variety of galvanic batteries are used in America. Grove's and Avery's are employed for telegraphing; Smee's for electro-plating; Bunsen's and Daniel's for electro-magnetic machines. Magneto-electric machines are not used for telegraphing in America; several years ago they were tried for a short period, in France, with problematical success, and some abortive experiments were made with one on the Atlantic telegraph cable.

O. M. J., of Pa.—Calcine sand in a furnace, and throw it, while hot, into cold water. By this treatment, it will become quite brittle, and may be easily reduced to powder by such stampers as are used to pulverize metallic ores.

MONEY RECEIVED

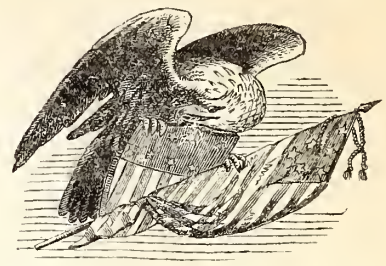
At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Nov. 24, 1860:—

J. L. W., of Ohio, $30; P. & B., of Ill., $15; B. T. B., of N. Y., $30; A. G. M., of N. Y., $55; R. H. H., of N. Y., $30; G. G. L., of Del., $50; J. H. D., of Mich., $30; J. F. P., of N. Y., $55; C. T., of Va., $30; S. B. H. V., of N. Y., $30; W. W. H., of Mo., $25; W. B. L., of N. Y., $10; J. R. B., of R. I., $30; S. B. E., of Conn., $35; O. E., of N. Y., $30; W. M. B., of Ind., $40; A. J. R., of N. Y., $50; G. W. H., of N. Y., $30; E. S., of N. Y., $30; G. N. B., of Conn. $30; B. M., of N. Y., $25; W. S. W., of N. Y., $55; S. & P., of N. Y., $20; H. M. C., of N. Y., $25; J. B. C., of Pa., $30; W. R. A. of Ill., $30; M. S. P., of Mass., $30; R. B. B., of N. Y., $35; N. E D., of Mo., $30; R. & H., of Iowa, $25; J. P., of N. Y., $90; J. S Y., of N. Y., $20; E. D. K., of N. Y., $30; J. S., of Pa., $15; P. H. of Mass., $50; C. B. C., of Mass., $25; S. & P., of N. Y., $20; J. C S., of Mass., $55; O. S., Jr., of Vt., $30; C. W. H., of Ill., $25; W. F. Q., of Del., $30; J. E. B., of Ind., $300; J. J. D., of N. Y., $55; A. J. B., of Ill., $25; H. T., of Ill., $25; L. P. T. of N. Y., $30; M. H. P., of N. T., $20; G. P. O., of N. Y., $60; C. L. B., of Mass., $32 S. B. E., of Conn., $35; P. P. S., of N. J., $30; C. G. D., of N. Y., $25; H. W., of Pa., $35; E. & H., of N. Y., $30; J. H., of Conn., $55; B. & B., of R. I., $40; W. H. T., of Mass., $25; G. W. R., of Ala., $30; W. W. H., of N. Y., $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Nov. 24, 1860:—

S. & P., of N. Y.; A. J. R., of N. Y.; J. M. A., of Cal.; B. M., of N. Y.. B. T. B., of N. Y.; H. M. C., of N. Y.; P. H., of Mass. (two cases); H. W., of Pa.; W. W. H., of Mo.; J. P. K., of N. Y.; J. F. P., of N. Y.; C. B. W., of N. Y.; J. C. S., of Mass.; B. & B., of R. I.; H. T., of Ill.; J. E. B., of Germany; J. H. G., of Ky.; C. B. C., of Mass.; M. R. F., of N. Y.; W. & B., of N. Y.; B. & B., of R. I; J. H., of Conn.; J. E. F., of Fla.; J. L. W., of Ohio; R. F. B., of N. Y.; G. G. L., of Del.; A. J. B., of Mich.; C. G. D., of N. Y.; W. S. W., of N. Y.; R. & H., of Iowa; J. S., of Pa.; J. McN., of Pa.

THE RISE AND PROGRESS OF INVENTIONS



During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,538; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

We may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining thereto.

FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

TESTIMONIALS.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs. MUNN & Co.:—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

USEFUL HINTS TO OUR READERS.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—New subscribers to the SCIENTIFIC AMERICAN can be furnished with the back numbers of this volume by signifying their wish to receive them, otherwise their paper will be sent from the date of receiving the subscription. Vols. I. and II. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1 50 per volume; by mail, $2, which includes postage. Price in sheets, $1. Every mechanic, inventor, or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

SUBSCRIBERS TO THE SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

GIVE INTELLIGIBLE DIRECTIONS.—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the Post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the Post-office at which they wish to receive their paper, and the State in which the Post-office is located.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was prepaid has expired; and the publishers will not deviate from that standing rule in any instance.

RATES OF ADVERTISING.

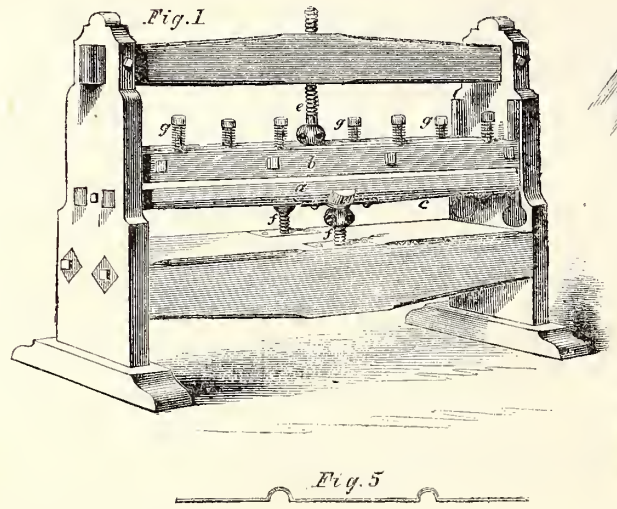
THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

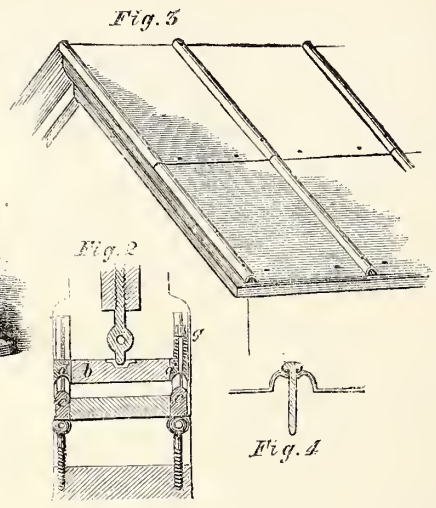
IMPROVED ROOFING AND MACHINE FOR MAKING ROOFING PLATES.

The attention of all who are interested in tight roofs —and who is not?—is invited to the invention here illustrated, which has been secured by application for two patents, one for the roofing, and the other for the machine for fashioning the plates. The roof is illustrated in Fig. 3 of the annexed cuts, and the machine for forming the plates in the other figures.

The roof consists of a series of tin or other metal plates, with semicircular raised edges, the upper ones lapping over the lower in the form of shingles, so as to carry off the water in the most absolutely certain and effectual manner. Fig. 1 is a perspective view of the machine for forming these plates.

Upon the horizontal bed plate, *a*, which is mortised firmly into the upright ends of the frame, the metal plate to be bent is laid, when the follower, *b*, which has semicircular grooves, *d d*, at both ends of its lower side, as shown in Fig. 2, is forced down upon it by turning the screw, *e*. Then the two dies, *c c*, Figs. 1 and 2, are pressed up against the plates by turning the screws, *f f*, thus pressing the edges of the plate into the grooves, *d d*, and forming a semicircular ridge on each edge of the plate. One of these ridges is made a little larger than the other, so that as the plates are laid upon the roof, the larger ridge on one side of each may fit tightly over the smaller ridge on the adjoining side of the contiguous plate.





Before the plate is released from the grasp of the press, the edges are punched with the holes for nailing it to the roof. For this purpose, the punches, *g g g*, are arranged loosely in holes in the follower, *b*, and are held up by spiral springs, so that the holes may be quickly punched by simply giving each of the punches a blow with a hammer. These punches are formed with rounded shoulders at a short distance from their ends, for countersinking a depression in the roofing plate, which is made to receive a watertight packing beneath the head of the securing nail. This packing is simply a washer of india-rubber, and as the nail head is driven down upon it, it is compressed into the countersunk cavity in the plate, completely packing it watertight, as shown in Fig. 4 The plates are nailed directly to the rafters, requiring no cross ribs except where the plates meet, as shown in Fig. 3.

The patents for these inventions have been applied for through the Scientific American Patent Agency, and will probably issue in a few weeks.

Further information in relation to the subject of these illustrations may be obtained by addressing the inventor, W. H. Beach, at Chicago, Ill.

MACHINISTS' PROFITS.

Industrial competition is more active in this country than in any other. Moderate capitals and small establishments, the latter carried on under the personal supervision of their proprietors, can command profitable business where larger concerns could not keep at work. It was attempted, a dozen or fifteen years ago, to monopolize all the machine building of the country in two or three large shops at Lowell, Lawrence, and other New England towns. These great establishments, however, backed by the heavy capital of a wealthy corporate ownership, did not hold their own, and small machine shops in all parts of the country have since secured most of the business to which they were devoted. Experience has fully proved that in this country no large shop can support itself when engaged on a large variety of work, and few large establishments can command full employment on a single class of machine work. No single management can successfully conduct the manufacture of cotton and woolen machinery, machine tools and locomotives, although there was hardly one of the eastern establishments which did not advertise to undertake all these varieties of work. The Taunton Locomotive Works, Guy, Silver & Co., and a few others achieved excellent reputations by adhering to a single class of works, and successful as was William Mason in the construction of locomotives, he found he could not carry on the business profitably in connection with the construction of cotton machinery. All over the country, excellence of design and workmanship is now considered in every kind of machine making, and firms engaged in special branches of work are, by the observance of these requisites, acquiring ample and profitable patronage. No tool-building shops are so prosperous as those in Philadelphia, and at none on this side of the Atlantic, if indeed, in the world, are so expensive tools built. The customers of these shops are convinced that the best and most expensive tools are cheapest, and the best makers have therefore a virtual monopoly of the business. Any business, under such circumstances, must become profitable, if reasonably conducted.

In England, the best engineers have made colossal fortunes; the Maudsleys are immensely wealthy; Robert Napier is a millionaire of many millions; Joseph Whitworth is understood to be worth $1,500,000, and he is the heaviest stockholder in the Electric Telegraph Company, in which he owns $350,000. It is not, however, the wealth of these men which secures to them a monopoly of work, for capital is so abundant in England that any man, if he were known to be equally capable of doing the very best work, could readily connect himself with wealthy capitalists. There are few, very few, first-class workmen in any country—very few, indeed, in our own. Now that the rage for cheap construction is over, such men can name their own prices, and in time their business must ultimately rank with the most profitable of any.—*The Builder.*

BEACH'S IMPROVEMENTS IN ROOFING.

Arrowroot Photographic Paper.—In Germany some of the photographic artists use paper prepared with arrowroot as a substitute for albumen. The London *Photographic News* describes the method of its preparation as follows:—"Dissolve 5 grammes of chloride of sodium, 0.05 grammes of citric acid, in 120 grammes of distilled water. Filter it when necessary, and pour the solution into a perfectly clean china evaporating dish. Then add to it 4 grammes of clean arrowroot meal, and heat it over a spirit lamp till it boils, stirring it all the while with a glass rod. The paper should be of medium thickness, and as fine in texture as possible. To apply the solution, fasten firmly with small nails at the four corners, as many sheets of paper as you wish to prepare, to a smoothly planed board, keeping carefully uppermost the side which has a fine even surface (called the 'felt side'). When the arrowroot solution is cold, carefully remove the film formed upon the surface, for this would easily make the preparation uneven. With a very clean, damp sponge take up a little arrowroot, and spread it over the uppermost sheet of paper in even stripes. It should only be touched lightly, so as not to make the paper rough. Then efface the stripes by soft touches with a second very clean sponge. Afterwards remove the paper from the board, hang it up on a line to dry, and treat the remaining sheets in the same manner. The quantity given in the above formula is sufficient for 12 sheets of 18 by 22 inches. The paper thus prepared may be kept for a long while. The citric acid serves to make the tone of the midddle tints rosy, and to keep the whites clear. Succinic acid and tartaric acid should not be used, because they make the paper easily turn yellow in the gold bath. A sixty-grain nitrate of silver bath is to be used, and the printing conducted in all respects as for albumenized paper, with the exception that the *sel d'or* toning bath is recommended.

One of the Largest Steamships Built in this Country.—There was recently launched, at Wilmington, Del., from the yard of Messrs. Harlan, Hollingsworth & Co., one of the largest iron steamships ever built in this country, in the presence of about 5,000 people. Among those present was Charles Morgan, Esq., of New York, for whom she was built. She is intended for the New Orleans and Galveston line, and will take her place abont the middle of December. She is called the *William G. Hewes*, named in honor of the president of the New Orleans, Ohio and Great Western Railroad Company of New Orleans, and is to be commanded by James Lawless, Esq., formerly of the steamship *Orizaba*. Her dimensions are: Length, 250 feet; breadth of beam, 36 feet; depth of hold, 20 feet. For strength and beauty of model she cannot be surpassed. Her engine is to be a marine beam; she will also have a steel boiler, which is the only one of any size ever built in this country. Both were built at the Morgan Iron Works in this city. The saloons are to be of hard wood finish, and fitted up in the most gorgeous style.